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CHIEF OF STAFF
SPACE AND MISSILE ORGANIZATION
AIR FORCE SYSTEMS COMMAND

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DOCUMENTAL HISTORY OF SAMSO

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VOLUME

3

DOCUMENTS
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Prepared by

S. A. Grassly

November 1971

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4. Memorandum for Colonel [redacted] (C/Gp3), LtCol Frederic C. E. Oder, subj: Report of Trip 18-21 September 1956, 27 Sep 56, w/atch.
5. Ltr, The Ramo-Wooldridge Corporation to LtCol F. C. E. Oder, subj: R-W Computer Developments, 8 Oct 56.
6. MFR, LtCol Quenten A. Riepe, subj: Operational Concept for WS 117L, 8 Oct 56.
7. Ltr (C/Gp3), LtCol Frederic C. E. Oder, thru AFPR Lockheed Aircraft Corp to Lockheed Aircraft Corporation, subj: Briefing on Advanced Electronic Ferret Reconnaissance System, 12 Oct 56.
8. DF, WDTR to WDO, Attn: Major Schiavo, subj: Briefing on Advanced Electronic Ferret Reconnaissance System, 12 Oct 56.
9. DF, WDTR to WDT, subj: Briefing on Advanced Electronic Ferret Reconnaissance System, 12 Oct 56.
10. Ltr (C/Gp3), LtCol Frederic C. E. Oder thru AFPRO to Lockheed Aircraft Corporation, subj: Use of Light Amplification Techniques in the Visual Reconnaissance Subsystem of WS 117L, 15 Oct 56.
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13. Ltr (C/Gp3), Simon Ramo, Executive VP Ramo-Wooldridge Corp, no subj, 29 Oct 56.
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15. MRS (DD Form 95), undated relating to above subject.

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24.. DD Form 613 (C/Gp3), RDB Project Card, Short Title: ERSSFARS, WS 117L, 2 Apr 57.

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33. Memo for WDT from WDGE, Col J. L. Hamilton, subj: Visit by Brigadier General Donald P. Graul, Comdr, RADC, 16 Sep 57.

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42. Memorandum for Col Terhune, WDTR, sgd Col Frederic C. E. Oder, subj: R-W Participation in WS 117L, 14 Feb 58.

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54. Weapon System 117L Program Status Report (C/Gp3), For Quarter Ending 30 Jun 58.

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137. Memorandum for Secretary of Defense (C/Gp4), from DAF, no subj, 9 Sep 59, w/Atch 1 of 3 Atch: Memorandum for Secretary of the Air Force, (C/Gp4), subj: Transmittal of the Fiscal Year 1961 Budget Estimate, 9 Sep 59.

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141. Msg (S/Gp3), from CINCSAC, DPLBC 2477, 170031Z Sep 59.

142. Memorandum for The Chairman, Joint Chiefs of Staff (C/Gp4), subj: Coordination of Satellite and Space Vehicle Operations, 18 Sep 59.

143. Ltr (FOUO), from Hq USAF sgd Gen Curtis E. LeMay, to Comdr ARDC, subj: Air Force Responsibilities to Other Elements of the DOD for Space Systems, 21 Sep 59.

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156. Msg (S/Gp3), fm ARDC RDRRB-23-31-E, 231715Z Oct 59.

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158. Interoffice Correspondence (C/Gp3), STL, R. F. Mettler to MajGen O. J. Ritland, subj: Operating Concepts for Military Satellite Systems, 2 Nov 59.

159. Msg (S/Gp3), WDZSO-11-1-E, 3 Nov 59.

160. MFR (S/Gp3), subj: SAMOS, MIDAS and DISCOVERER Programs, 6 Nov 59.

161. Msg (S/Gp3), fm CINCSAC, DPL 4298, 060010Z Nov 59.

162. Ltr (S/Gp3), AFBMD (WDPCR), to Director ARPA, subj: SAMOS Program Report, 31 Oct 59, 9 Nov 59.

163. ARDC Form 111, subj: Advanced Reconnaissance System, 13 Nov 59.

164. Memorandum for the Secretary of the Air Force (S/Gp3), SOD, subj: Transfer of the SAMSO Development Program to the Department of the Air Force, 17 Nov 59.

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171. Memorandum for the Secretary of the Air Force (S/Gp3), subj: Intelligence System SAMOS, 7 Dec 59.

172. Ltr, WDZ, sgd MajGen O. J. Ritland to Mr. Donald W. Douglas, Jr, subj: Thor Boosters, 8 Dec 59.

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175. Msg (S/Gp3), SAC Offutt AFB to CofS Hq USAF, VC 5540, 161725A Dec 59.

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180. Msg (S/Gp3), fm Hq USAF to SAC, AFCVC 98219, 212155Z Dec 59.

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188. Msg (S/Gp3), SAC to CofS USAF, VC 07[illegible], 19 Jan 60.

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191. Msg (S/Gp3), Hq USAF to Comdr ARDC, Info: Comdrs AFBMD, ADC, SAC, AMC, AFDAT 66936, 292335Z Jan 60.

192. Ltr (S/Gp3), WDZP to Hq USAF (AFDAT, subj: Transmittal of Discoverer, SAMOS and MIDAS Development Plans, 30 Jan 60.

193. Msg (C/Gp3), fm AFBMD to CofS, info: ARDC, WDZY-1-6-E, 1 Feb 60.

194. LMSD Report (S/Gp4), Suggested Thorad/Agena Combination for SAMOS Program, 11 Feb 60.

195. Msg (S/Gp3), fm Hq USAF, AFDAT 70703, 152057Z Feb 60.

196. Msg (S/Gp3), fm SAC MIKE to CINCSAC, DDS-2-1-E, 16 Feb 60.

197. Chronology (S/Gp3), 17 Feb 60.

198. Msg (S/Gp3), fm Hq USAF to AFBMD and ARDC, AFABF and AFDDP 73993, 271712Z Feb 60.

199. Ltr (S/Gp1), fm WDZ to ARDC, subj: Joint French - U. S. Military Satellite Project, 29 Feb 60.

200. Current Status Report (S/Gp3), Feb 60.

201. Status Report - SAMOS (S/Gp3), Mar 60.

202. Memorandum for the Secretary of the Air Force (S/Gp3), subj: Intelligence System SAMOS, Apr 60. [Written 7 Dec 59]

203. Current Status Report (S/Gp3), Apr 60.

204. Ltr, ARDC, sgd MajGen James Ferguson to AFBMD, subj: User Participation, 12 Apr 60, w/1 Atch: Policy Statement.

205. Memorandum for Secretary of the Air Force (S/Gp3), sgd Herbert F. York, subj:SAMOS, MIDAS and DISCOVERER Research and Development Programs and Development/Operational Plans for SAMOS and MIDAS Programs, 20 Apr 60.

206. Ltr (S/Gp3), Lockheed Aircraft Corporation to AFBMD, subj: Augmented Re-Entry and Recovery Program, 19 May 60, w/1 Atch: Proposed Augmented Re-Entry & Recovery Program.

207. Msg (S/Gp3), fm AFBMD to ARDC, WDZY-4897, 24 May 60.

208. Ltr (S/Gp3), DAF (AFDST-AT) sgd LtGen Roscoe C. Wilson, subj: Exploitation of Initial SAMOS Data, 1 Jun 60.

209. Msg (S/Gp3), fm AFBMD to LMSD, Sunnyvale, Calif, WDZY-5271, 1 Jun 60.

210. Ltr (S/Gp3), ARDC (RDY), sgd MajGen James Ferguson, subj: Exploitation of Initial SAMOS Data, 14 Jun 60.

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212. Memorandum for Secretaries of the Army, Navy and the Air Force fm Secretary of Defense, subj: Coordination of Satellite and Space Vehicle Operations, 16 Jun 60.

213. Ltr (S/Gp3), fm CINCSAC to LtGen Bernard A. Schriever, Comdr ARDC, no subj, 16 Jun 60, w/1 Atch: CINCSAC Ltr to Gen Thomas D. White, 16 Jun 60.

214. Ltr (S/Gp3) fm USAF CofS Thomas D. White to Gen Thomas S. Power, CINCSAC, subj: SAMOS and MIDAS, 16 Jun 60.

215. Ltr (S/Gp3), fm Lockheed Aircraft Corp, to AFBMD, subj: Augmented Re-entry and Recovery Program, 20 Jun 60, w/1 Atch: Subcontract Work Statement, LMSD/362527.

216. Ltr (S/Gp3), AFCIN to AFCHQ (Gen Smith), subj: Letter of Nonconcurrence, 21 Jun 60, w/o atchs.

217. Back-up Material for Secy Gates presentation to the President (S/Gp3), subj: SAMOS, 23 Jun 60.

218. Ltr (C/Gp4), SAC MIKE, AC, to Major Spindler, subj: SAMOS, 24 Jun 60.

219. Ltr (S/Gp3), sgd Gen Thomas S. Power, CinCSAC to Gen Thomas D. White, USAF CofS, no subj, 24 Jun 60.

220. Ltr (S/Gp3), sgd Gen Thomas S. Power, CINCSAC to LtGen Bernard A. Schriever, comdr ARDC, no subj, 24 Jun 60.

221. Ltr (S/Gp3), Hq USAF, AFCIN to DCS/D, subj: SAMOS, 24 Jun 60.

222. SSS (S/Gp3), fm AFDSD-AT, sgd John L. Martin, Jr, subj: SAMOS, 27 Jun 60, w/o Atchs.

223. Ltr (S/Gp3), sgd Col Lowell E. May, Chairman, Satellite Intelligence Requirement Committee to Secretary, United States Requirements Committee, subj: Transmittal of Intelligence Requirements for Satellite Reconnaissance Systems of which SAMOS is an Example, 29 Jun 60, w/1 Atch: Proposed letter of SOD.

224. Supplemental Hq USAF Guidance to ARDC, SAC and ADC Concerning SAMOS (S/Gp3), 29 Jun 60.

225. Ltr (S/Gp3), fm Hq USAF, Office of CofS, AFCCS, to Gen Thomas R. Power, CINCSAC, subj: SAMOS, 29 Jun 60.

226. Ltr (S/Gp3), Hq USAF, AFDSD-AT to Multiple Addresses, subj: SAMOS, 30 Jun 60, w/o Atchs.

227. Ltr (S/Gp3), Hq USAF, AFCRQ-PN/Panel, to Reconnaissance Panel and SAMOS working Group Members, subj: Minutes of Joint Meeting of Reconnaissance Panel and SAMOS Working Group, 1 Jul 60, 1 Jul 60, w/4 Atchs of 5 Atchs: 1. Ltr fm Gen Wilson to ASDC, 1 Jun 60 (S); 2. Ltr fm Gen White to Gen Power, 29 Jun 60 (S); 3. Supplemental Guidance by Gen Strother (S); 4. Factors considered in Guidance Preparation (S).

228. Intelligence Requirements for Satellite Reconnaissance Systems of which SAMOS is an Example (S/Gp3), 5 Jul 60, w/o Atchs.

229. Ltr (S/Gp3), AFORQ-RN/Panel to Reconnaissance Panel and SAMOS Working Group Members, subj: Minutes of Joint Meeting of the Reconnaissance Panel and SAMOS Working Group, 6 Jul 60, 6 Jul 60.

230. Ltr (S/Gp3), AFORQ-RN/Panel to Reconnaissance Panel and SAMOS Working Group Members, subj: Minutes of Joint Meeting of the Reconnaissance Panel and SAMOS Working Group, 7 Jul 60, 11 Jul 60.

231. Msg (S/Gp3), fm Hq USAF to Comdr ARDC, info: Comdr AFBMD, 20 Jul 60.

232. Ltr, AFBMD (WDLPM-3, to WDLE-1, WDZ and WDG In Turn, subj: Request for Approval - PR-61-BMD-59, 25 Jul 60.

233. Ltr (S/Gp3), sgd Gen Thomas S. Power, to Gen Thomas D. White, CofS, subj: SAMOS, 26 Jul 60.

234. Special Order No. 540 AFBMD 27 Jul 60.

235. Ltr (S/Gp3), SAC MIKE (DSS, to WDZ, subj: SAMOS System Improvement, 29 Jul 60.

236. SO No. 562 AFBMD 4 Aug 60.

237. Ltr (C/Gp4), WDZ to Col Paul J. Heran, Chairman, Source Selection Board, E-6 SAMOS, 30 Jul 60.

238. Msg (S/Gp3), fm AFBMD to AFBMD Field Office, Patrick AFB,[illegible],2 Aug 60

239. Msg (S/Gp3), fm Hq AFBMD to 1st Msl Div, Vandenberg AFB, info: ARDC, WDLL 4-8-3, 4 Aug 60.

240. Msg (S/Gp3), fm Comdr,Hq AFBMD, to Comdr ARDC, WDG-6-8-20, 7 Aug 60.

241. Ltr, WDG to WDZ, subj: RAND Letter L-15001, w/1 Atch, Ltr RAND Corp, 29 Jul 60.

242. Ltr, WDG to Mr. Herschel J. Brown, VP and Gen Mgr, Lockheed Missile and Space Division, no subj, 10 Aug 60.

243. Ltr, AFBMD (WDZE), to WDA, subj Organizational Announcement, 10 Aug 60, w/2 Atch: 1. Symbol Listing for WDR, Space Security Reconnaissance; 2. Symbol Listing for WDZ, Space Programs.

244. SAMOS Launch Schedule Revisions (S/Gp3), 11 Aug Development Plan.

245. Ltr (FOUO), WDV to Col Evans (WDZ), subj: Issuance of RFP's on the SAMOS Second Source, 12 Aug 60, w/1 Atch: MFR, 12 Aug 60.

246. Ltr (C/Gp3), WDZ, sgd MajGen O. J. Ritland, to Dr. Ivan A. Getting, Pres, The Aerospace Corporation, subj: SAMOS Program, 12 Aug 60.

247. Ltr (S/Gp3), sgd Thomas D. White, CofS, to Gen Thomas S. Power, CINCSAC, subj: SAMOS, 17 Aug 60.

248. MFR (S/Gp3), AFARF-10, sgd Lewis C. Meyer, Ch, RD& Missile Div, Directorate of Budget, subj: SAMOS Revised Development Plan, 18 Aug 60.

249. MFR (S/Gp3), prepared by Maj. H. C. Howard, AFDSD, subj: SAMOS Management Plan, 22 Aug 60, w/1 Atch: Changes to the Current Status Report SAMOS.

250. Ltr, AFCCS to Deputies, Directors and Chiefs of Comparable Offices (No. 10), subj: Briefings for Individuals outside of the Executive Branch of the Federal Government, 29 Aug 60.

251. Secretary of the Air Force Order No. 115.1, subj: Organization and Functions of the Office of Missile and Satellite Systems, 31 Aug 60.

252. Secretary of the Air Force Order No. 116.1, subj: The Director of the SAMOS Project, 31 Aug 60.

253.✓ Memorandum for the Chief of Staff from Dudley C. Sharp, Secretary of the Air Force, 31 Aug 60, w/1 Atch: List of assigned personnel.

254.✓ Organization and Functions of the Office of Missile and Satellite Systems, ca 31 Aug 60.

255. Status Report (S/Gp3), subj: SAMOS (WS 117M), 31 Aug 60.

256. SO No. 649 AFBMD 2 Sep 60.

257. Ltr (C/Gp4), WDRSC to WDZJS, subj: Thor Boosters for SAMOS Program, 6 Sep 60.

258. Revised FY 1961 and FY 1962 Communication Cost Estimate Budget Projects 840 & 850 - SAMOS (S/Gp3), 12 Sep 60.

259. Memorandum for the Secretary of the Air Force (FOUO), subj: Reconnaissance Satellite Program, sgd James H. Douglas, Acting SOD, 15 Sep 60.

260. Ltr, SAFMS-1, sig BrigGen Robert E. Greer, subj: Establishment of SAMOS Project Office, 15 Sep 60.

261. GO No. 96 ARDC (FOUO), subj: Discontinuance of 4999th Data Processing Squadron, 21 Sep 60.

262. Director of SAMOS and Deputy Commander Space Programs Organization, 22 Sep 60.

263. GO No. 40 DAF, subj: Abolishment of the Office of the Assistant Chief of Staff, Buided Missiles, 23 Sep 60.

264. Ltr, AFBMD (WDG), sgd BrigGen Harvard W. Powell, to Deputy Commanders, Deputy Chiefs of Staff, Chiefs of Special Staff Offices, Chiefs of Offices through Directorate Level and Commanders of AFBMD Subordinate Organizations, subj: Correspondence Pertaining to the SAMOS Project, 26 Sep 60.

265. Ltr (S/Gp3), SAFMS-IDP to WDGE, subj: Items for Inclusion in AFBMD Chronology for Period 1 Jan - 30 Jun 60, 23 Sep 60, w/o Atch.

266. SAMOS Directives and/or Guidance (S/Gp3), ca Oct 1960.

267. SAMOS Program Progress Report Month Ending 30 Sep 60 (RCS: DD-DR&E (M) 397, 10 Oct 60.

268. AFBMD News Release, subj: SAMOS I Fact Sheet, ca 11 Oct 60.

269. Msg from AFBMD to ARDC, WDLP-17-10-7, 18 Oct 60.

270. Draft News Release, 18 Nov 60.

271. Draft News Release, 21 Nov 60.

272. Draft News Release, 21 Nov 60.

273. Mission Statement, 6594th Test Wing, 29 Dec 60.

274. Chronology of Sentry and SAMOS Program 2 March 1959 to December 1960, (S/Gp3), Jan 61.

275. Ltr, Aerospace Defense Systems Office (ADC), ADSO to WDL, subj: Using Command Participation, 24 Jan 61, w/o Atch.

276. AFBMD News Release 61-18, ca 31 Jan 61.

277. AFBMD News Release 60-82, subj: SAMOS II Fact Sheet, ca 31 Jan 61.

278. Msg (C/Gp3), fm AFCCS to ARDC, AFCCS 87626, 092319Z Feb 61.

279. SO No. G-15, ARDC, 16 Feb 61.

280. Ltr (C/Gp4), WDZJS, to LBZST, subj: Procurement of 4 Thor Boosters, 14 Mar 61.

281. Ltr, sgd BrigGen Harvard W. Powell, to Comdr Pac Msl Rg, Point Mugu, Calif, subj: PMR Support of SAMOS and MIDAS Programs, ; 7 Apr 61.

282. Memorandum for the Secretary of Defense, Attn: BrigGen George S. Brown, (S/Gp3), subj: SAMOS Launch Report, 11 Sep 61.

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Jan 1960

PRIORITY AF AFCVC 98219

SAC OFFUTT AFB NEBR

COFS USAF WASH D.C.

INFO: ARDC ANDREWS AFB MARYLAND

/SECRET/ VC 0206. PERSONAL FOR GENERAL LEMAY FROM GENERAL GRISWOLD: INFO: GENERAL SCHRIEVER. SUBJECT: (U) SAMOS and MIDAS. This msg in 5 parts. PART I: Reference is made to your message, AFCVC 98219, dated 21 Dec 59, which (a) stated that the AFBMC will examine the possibility of financing AFBMC approved items by reprogramming from within current resources: (b) requested SAC to submit any recommendations or reductions from within SAMOS and MIDAS or from SAC weapon systems considered to be of a lesser priority. PART II: The basic SAC position is that "warning is everone's business" and that any further slippage in the operational dates for SAMOS and MIDAS may very well jeopardize national

DPLBC 4 1330 Jan 60

Lt Col Mulling/jka
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security. Without adequate strategic intelligence and warning, all of the DoD atomic strike units will be vulnerable to a surprise attack. PART III: Accordingly, it is our conviction that the lack of an adequate collection system for strategic intelligence and warning is one of the biggest deficiencies in the USAF. Therefore, all areas, not just strategic systems, should be examined in order to obtain the monies required to meet an operational date of 1 July 62 for SAMOS and Jan 63 for MIDAS. PART IV: To insure that only the minimum essential requirements are being reflected into SAMOS and MIDAS, SAC by messages on 16 and 30 Dec 59 to ARDC has requested a SAC/ARDC meeting to jointly review the progress and to coordinate on the forthcoming AFBMC presentation. PART V: SAC recommendations in response to your 21 Dec 59 message will be made during the briefings scheduled by AFDAT message 61415 dated 7 Jan 1960.

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BT
/~~S E C R E T~~/FROM ADLPD-D 1
FOR DCS/D, HQ USAF
SUBJ CLN /U/ MIDAS/SAMOS PROGRAMS

THIS MESSAGE IN 3 PARTS. PART I. BY AFDAT 1259/59 DTD 19 OCT 59 HQ USAF DIRECTED ARDC, ADC, SAC AND AMC TO IMMEDIATELY PREPARE RESPECTIVE DEVELOPMENT, OPERATIONAL, AND LOGISTIC PLANS FOR THE MIDAS AND SAMOS PROGRAMS AND SUBMIT THE PLANS TO HQ USAF BY 23 NOVEMBER AS A MATTER OF URGENCY. EXPEDITED ACTION WAS TAKEN BY ALL COMMANDS TO MEET THIS DEADLINE. MEANWHILE, PRIOR TO 23 NOV AND SUB-

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PAGE TWO RJWFAL 5C

SEQUENTYLY, CERTAIN INSTRUCTIONS BASED ON REDUUCED FYS60 G YQ FUNDING FOR THESE PROGRAMS WERE RECEIVED WHEREBY DELIVERY OF PLANS WAS DELAYED, AND IT NOW APPEARS THAT MIDA/ SAMOS PROGRAMS WILL BE SEVERLY DELAYED IN THE R&D PHASE AND THAT NEGLIGIBLE FUNDING IS PLANNED IN FY 60 AND 61 FOR IMPLEMENTING THE OPERATIONAL PHASE. PART II. IN VIEW OF THE URGENT NEED FOR THE SEVERAL EXCELLENT MILITARY ADVANTAGES TO BE GAINED BY MIDAS/SAMOS THIS COMMAND IS GRAVELY CONCERNED OVER ANY ACTIONS THAT WOULD DELAY GAINING THE EARLIEST POSSIBLE OPERATIONAL CAPABILITY FOR THESE SYSTEMS. THIS COMMAND IS FULLY COGNIZANT THAT BOTH SYSTEMS ARE DEMANDING MUCH OF THE STATE-OF-THE-ART IN THEIR DEVELOPMENT. HOWEVER, IT IS BELIEVED THAT BOTH THE DEVELOPMENT AND OPERATIONAL PROGRAMS SHOULD PROCEED CURRENTLY AND BOTH BE ADEQUATELY FUNDED SO THE HERETOFORE PLANNED OPERATIONAL DATES CAN BE REALIZED. FAILURE TO PROCEED CONCURRENTLY WILL DELAY ESSENTIAL USAF AEROSPACE CAPABILITY. PART III. YOUR REDUCTION IN FUNDING AND ATTENDANT PROGRAM SLOW DOWN APPEARS TO BE A CHANGE IN URGENCY FOR ATTAINING MIDAS/

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[illegible] IS GRAVELY CONCERNED OVER ANY ACTIONS THAT WOULD DELAY GAINING THE EARLIEST POSSIBLE OPERATIONAL CAPABILITY FOR THESE SYSTEMS. TH[illegible] COMMAND IS FULLY COGNIZA THAT BOTH SYSTEMS ARE DEMANDING MUCH OF THE STATE-OF-THE-ART IN THEIR DEVELOPMENT. HOWEVER, IT IS BELIEVED THAT BOTH THE DEVELOPMENT AND OPERATIONAL PROGRAMS SHOULD PROCEED CURRENTLY AND BOTH BE ADEQUATELY FUNDED SO THE HERETOFORE PLANNED OPERATIONAL DATES CAN BE REALIZED. FAILURE TO PROCEED CONCURRENTLY WILL DELAY ESSENTIAL USAF AEROSPACE CAPABILITY. PART III. YOUR REDUCTION IN FUNDING AND ATTENDANT PROGRAM SLOW DOWN APPEARS TO BE A CHANGE IN URGENCY FOR ATTAINING MIDAS/

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PAGE THREE RJWFAL 5C
SAMOS OPERATIONAL CAPABILITY. HOWEVER, THIS HQ HAS RECEIVED NO MESSAGE SPECIFICALLY STATING A CHANGE OF URGENCY. THEREFORE, REQEST YOU ADVISE THIS HQ ON FOLLOWING QUESTIONS CLN
FIRST, HAS THERE BEEN A DIRECTED CHANGE IN MIDAS/ SAMOS PROGRAM URGENCY QUES IF SO, WHAT WERE THE CONSIDERATIONS AND BASIS FOR THE DECISION QUES
SECOND, WHAT ACTION IS BEING TAKEN TO PROVIDE ADEQUATE FUNDING FOR CONCURENT PURSUAL OF DEVELOPMENTAL AND OPERATIONAL PROGRAMS QUES
THIRD, WHAT CHANGE OF ACTION IS EXPECTED OF ADC IN VIEW OF THE REDUCED FUNDING DIRECTIVES SENT TO ARDC BY HQ USAF QUES
BT
04/2000Z JAN RJWFAL

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WDZE

4 JAN 1960

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PP RJWZBK
DE RJEZFF 25C
P 042120Z
FM ARDC ANDREWS AFB MD
TO AFBMD LOS ANGELES 45 CALIFORNIA
BT

/S E C R E T /RDRRB/4/1/4E ATTN WDZ COLONEL CURTIN WDGE, COLONEL SOPER WDZY, COLONEL ODER. SUBJECT /U/ SAMOS/MIDAS PROGRAMS. REFERENCE SAC MESSAGE CITE 1004 5919, 30 DECEMBER 1959. THIS MESSAGE IN TWO PARTS. PART 1. THE FOLLOWING MESSAGE TO SAC HAS BEEN DISPATCHED IN ANSWER TO REFERENCED MESSAGE. QUOTE SECRET/ RDRRB/4/1/3E SUBJECT SAMOS AND MIDAS PROGRAMS /U/. MESSAGE. IN TWO PARTS. PART 1. REFERENCE YOUR MESSAGE DPL 5919, 30 DECEMBER. ARDC CONCURS WITH THE PRINCIPLE THAT SAC AND ARDC JOINTLY RE-EXAMINE THE SAMOS, AND MIDAS PROGRAMS IN ORDER TO DEVISE A USEABLE PROGRAM PERMITTING RETENTION OF AN OPERATIONAL CAPABILITY WITHIN THE EXISTING FUND

PAGE TWO RJEZFF 25C

CEILINGS. THE SAMOS SUB-SYSTEM I CONFERENCE SCHEDULED AT HQ ARDC THIS WEEK IS AN EXAMPLE OF THIS TYPE OF SAC AND ARDC JOINT CONFERENCE TO RESOLVE MUTUAL PROBLEMS. PART 2. ARDC HAS DIRECTED AFBMD TO CONTACT YOUR HEADQUARTERS DIRECTLY AND ARRANGE FOR A SUITABLE WORKING GROUP MEETING AS SOON AS POSSIBLE UNQUOTE. PART 2. REQUEST YOU CONTACT SAC DIRECTLY AND ARRANGE FOR A SUITABLE WORKING GROUP MEETING AS SOON AS POSSIBLE.

BT
042024Z JAN RJEZFF

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BT

Subject
117L Dev. Plans

~~C O N F I D E N T I A L~~ /FROM [redacted] 61415
REFERENCE [redacted] 98212, DTD 21 DEC 59.
THIS IN TWO PARTS.
PART I. THIS HQ IS ATTEMPTING TO IDENTIFY LOWER PRIORITY PROGRAMS FROM WHICH POSSIBLE REPROGRAMMING ACTIONS COULD TAKE PLACE. ARDC IS DIRECTED TO INCLUDE IN THE REVISED DEVELOPMENT PLANS THE FY 62 AND 63 FUND ESTIMATES. THESE ESTIMATES SHOULD BE ARDC RECOMMENDATIONS BASED ON MAINTAINING THE FY 60 AND 61 CEILINGS REF PART I OF [redacted] 98212 AND THE REQUIREMENT TO BECOME FULLY OPERATIONAL AS SOON AS PRACTICABLE.
PART II. REF PART III OF [redacted] 98212. THE TENTATIVE REVISED

PAGE TWO RJEZHQ 369
SCHED FOR PRESENTING THE REV PLANS IS: 1 FEB TO AIR STAFF; 5 FEB TO [illegible] BOARD; 16 FEB TO AFBMC. SUBMITTAL BY THIS HQ OF OPNS PLANS, ER RELATIONSHIPS AND DEV PLANS SEC/DEF 15 FEB.
BT
07/2253Z JAN RJEZHQ

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[illegible] Weapons Board

Lt Col John D [illegible]
[illegible], Weapons Bd

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AFCRQ-WB

Report of Weapons Board [illegible] 60-1

11 January 1960

Members, Weapons Board

1. The Weapons Board [illegible] 60-1 at 0900 hours, Wednesday, 6 January [illegible]:

a. DISCOVERER, [illegible] Phase Proble

b. [illegible] III

2. The following [illegible]:

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19 Jan 1960

PRIORITY: AF ORIG

SAC OFFUTT AFB NEBRASKA

COFS USAF WASHINGTON D. C.

SECRET/C 0706 FOR GENERAL WHITE FROM GENERAL POWER. INFO: AFAMA-2B. SUBJECT: (U) Principal problems of Major Air Commands. This message in 2 parts. PART I: PROBLEMS ON WHICH I BELIEVE SPECIFIC EMPHASIS SHOULD BE PLACED (1) SAMOS-MIDAS PROGRAMS. As I pointed out in my last message, I am deeply concerned about the possibility of further slippage in the SAMOS and MIDAS Programs. In the interim period certain events have transpired which only serve to strengthen my firm conviction that the Air Force cannot afford to let these programs slip any further. First, I refer to the recent series of newspaper headlines wherein Mr. Khrushchev publicly announced that he now has ballistic missiles in quantity and accordingly will materially reduce

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SAC OFFUTT AFB NEBR

the Soviet troop strength. The propaganda, political and military implications of this action are obvious and far reaching. The second event I refer to is the President's recommendation that Congress mend the National Aeronautics and Space Act to clearly delineate the necessity for both a civilian and a military space program. This recommendation stated among other things that, "the military utilization of space is integral to the total defense program of the United States." In view of the above and recognizing our great lack of specific knowledge as to exactly where Russia ballistic missiles are sited, and appreciating that in the missile era, warning is the key to survival, it is clear to me that the Air Force simply cannot afford to let these two programs slip any further. I am well aware that DODRE motivated the current budget exercises, aimed at a reduced or "fly before buy" program, because of their question on system reliabilities. However, General Schriever has assured us that these programs can be made operational on time, with adequate funds. Since any further slippage in SAMOS and MIDAS may very sell jeopardize National

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SAC OFFUTT AFB NEBR

security, I strongly recommend that the USAF fund for an operational date of 1 July 62 for SAMOS and a 1 January 1963 for MIDAS and place the responsibility for any delay of these programs upon the DOD. Specifically it is recommended that this position be endorsed by the AFBMC during the 10 February 60 meeting on this problem area.

(2) THE MK-2B RESTRICTION

(3) THE MINUTEMAN WARHEAD DECISION

PART II: Timely and fovorable solutions to the above are extremely important to this Command. Your continued support and personal attention to these subjects is requested.

27 Jan 1960

189

HEADQUARTERS
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
UNITED STATES AIR FORCE
Air Force Unit Post Office, Los Angeles 45, California

REPLY TO ATTN OF: WDZ

SUBJECT: Visit of DOD Advisory Group on Electronics (Baker Committee)

TO: WDGV

1. The Department of Defense COMINT/COMSEC/ELINT Advisory Group and selected guests will visit AFBMD for briefings on SAMOS at 0830-1400, Wednesday, 27 January 1960. Attached is a copy of the Agenda and a copy of the group's itinerary and composition.

2. The stated purpose of the visit is for the group to become as knowledgeable as possible on the status of major elements of SAMOS and the projected direction of the program, in order that they will understand the true implications of recommendations made to them and/or that they will make to Dr. York during the Development Plan reviews next week.

3. It is recommended that your introductory comments emphasize the R&D nature of SAMOS and the formidable task we face in getting all the nuts and bolts integrated smoothly into a reliably functioning system. The difficult task ahead might be compared to the early difficult phases of the ballistic missile programs when they were embarking upon their initial test phases, emphasizing the need for maintaining development flexibility and sufficient testing before being considered suitable for operations. In addition the point might be made that those who are responsible for the effective development must have some latitude within which to work in order to most expeditiously and efficiently realize the goods established. (As you are so well aware SAMOS seems to be redesigned, reengineered and certainly reprogrammed individually by every governmental group and agency at least once each fiscal year.)

4. The visiting group is composed of many persons in high authority. It appears that within this overall group Dr. Billings, Mr. Coyne, Mr. Weaver, Mr. Hinshaw, Dr. Baker and Dr. Tordella are particularly important. It has therefore been suggested that a short pre-briefing welcome of these six persons in your office upon arrival at 0830 might be in order followed by a short welcome message to the entire group which will be convened in the Command Presentation Center. Captain Erickson has arranged a luncheon for the group which, if your schedule permits attending, would present a fine opportunity for further discussion.

2 Atch
1. Agenda
2. Group's Itinerary

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Why does R&D

Costs of Processing
R&D Costs

Vandenburg Link

Cost - Why

OFFICIAL USE ONLY

AGENDA

SAMOS BRIEFING

2~~6~~7 January, 1960

Coffee

PRESENTATION CENTER

0845	Welcome	Gen Terhune
0850	SAMOS + Film	Col King
0930	SS/E	Maj Conway ✓
0950	SS/F	Maj Copley ✓

Coffee

1050	SS/I	Maj Wienberg ✓
		Dr. Drukey
1130	System Studies	Dr. Edmundson ✓

Lunch

1400 Transportation to JPL -------Front Bldg #3

190

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ACTION

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FM CINCSAC OFFUTT AFB NEBR
TO RJEZHQ/USAF WASHINGTON D C
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RJWZBK/AFBMD INGLEWOOD CALIF
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~~S E C R E T~~ VC 0847. PERSONAL FOR GENERAL LEMAY FROM GENERAL GRISWOLD. SUBJECT IS SAMOS AND MIDAS. THIS MESSAGE IN V PARTS. PART I: REFERENCE IS MADE YOUR MESSAGE AFCVC 98219 DATED 21 DECEMBER 1959 AND MMY INTERIM EANNSWER VC-0206 DATED 6 JANUARY 1960. PART II: SAC AND ARDC REPRESENTATIVES HAVE REVIEWED THESE PROGRAMS WITH A VIEW TO REDUCING THE REQUIREMENTS TO MINIMUM ESSENTIAL. FROM OUR VIEWPOINT, HOWEVER, ARDC (AFBMD) WILL HAVE TO PRESENT A MORE OR LESS DIRECTED SOLUTION TO THE AFBMC IN ACCORDANCE WITH THE

R

FUND CEILINGS CONTAINED IN AFDAT 98212. WITH REGARDS TO SAMOS, AFBMD IS CURRENTLY PLANNING ON PRESENTING A PROGRAM, IN KEEPING WITH THE AFDAT CEILING, WHICH [illegible] HAS ENTITLED "MINIMUM ESSENTIAL R&D PROGRAM". THIS PROGRAM WOULD LEAD TO AN OPERATIONAL PROGRAM SOMETIME IN 1964. IN ADDITION AFBMD WILL PRESENT ANOTHER, SLIGHTLY MORE COSTLY, PROGRAM WHICH THEY HAVE ENTITLED "DEVELOPER/OPERATOR PROGRAM". THIS LATTER SAMOS PROGRAM WOULD PRODUCE A SUBSCALE OPERATION PROGRM IN LATE 1963, VERSUS A PREVIOUSLY AGREED TO FULLY OPERATIONAL DATE OF 1 JULY 1962.

BOTH OF THESE PROGRAMS ARE, OF COURSE, UNACCEPTABLE TO SAC. IN THIS CONNECTION REFERENCE IS MADE TO A MESSAGE FROM GENERAL POWER TO GENERAL WHITE, CITE C-0706 DATED 25 JANUARY 60, SUBJECT: "PRINCIPAL PROBLEMS OF MAJOR COMMANDS". PART III: REFERENCE IS MADE TO AFDAT MESSAGE 64965, DATED 22 JANUARY 60 WHICH STATED, "IN ADDITION TO RECOMMENDATIONS FOR MIDAS IN ACCORDANCE WITH ACTIONS DIRECTED IN AFDAT 98212, IT IS REQUESTED THAT ARDC BE PREPARED TO DISCUSS A PROGRAM

Double Talk!

[redacted]

PAGE THREE RJWXBR 123

THAT WOULD INSURE THE EARLIEST POSSIBLE OPERATIONAL DATE FOR MIDAS ASSUMING A 1 MARCH 1960 GO-AHEAD".

PART IV: IN VIEW OF THE ABOVE, AFDAT MESSAGE AND APPRECIATING THE TECHNICAL INTERFACE BETWEEN SAMOS AND MIDAS AND AT THE SAME TIME RECOGNIZING THAT THE PRESIDENT HAS PREVIOUSLY ESTABLISHED A DX PRIORITY FOR SAMOS, IT IS REQUESTED THAT ARDC (AFBMD) BE DIRECTED TO ALSO BRIEF A SAMOS PROGRAM THAT WILL PERMIT A 1 JULY 1962 OPERATIONAL DATE. IT IS AGAIN RECOMMENDED THAT THE AFBMC, DURING ITS 10 FEBRUARY 60 MEETING ON THIS SUBJECT, FUND FOR AN OPERATIONAL DATE OF 1 JULY 62 FOR SAMOS AND 1 JANUARY 63 FOR MODAS.

PART V: IT IS DESIRED TO HAVE SAC REPRESENTATION AT THE 3 FEBRUARY 60, WEAPONS BOARD MEETING AND THE 10 FEBRUARY 1960 AFBMC MEEGING ON THIS SUBJECT. NAMES OF SAC REPRESENTATIVES TO THE 3 FEBRUARY 60 WEAPONS BOARD MEETING ARE COLONEL R. C. DUPONT, LT COLONEL EUGENE G. MULLING AND MAJOR L. D. UNDERWOOD. NAMES OF TWO (2) SAC REPRESENTATIVES TO THE 10 FEBRUARY 50 AFBMC MEETING WILL BE FORWARDED NLT 6 FEBRUARY 1960.

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BT
//~~S E C R E~~ T//FROM AFDAT 66938 REFERENCE PART III AFDAT MSG 96212, 21 DEC 59; PART II AFDAT MSG 6A15, 7 JAN 60
THIS MSG IN TWO PARTS.
PART I. THE FIRM SCHEDULE FOR PRESENTING THE REVISED PLANS FOR DISCOVERER, SAMOS, MIDAS IS: 1 FEB 60 TO AIR STAFF, 1400, RM 4C-1052; 3 FEB 60 TO WEAPONS BOARD, 0930, RM 4C-1058; 10 FEB 60 TO AFCNC, 1400, RM 4C-1052; SUBMITTAL OF DEVELOPMENT PLANS TO OSD 17 FEB 60, 1400, 3E-139 AND OPERATIONAL PLANS WITH USER RELATIONSHIPS TO OSD 25 FEB 60, 1400, 3E-139.
PART II. (FOR ARDC)

1 1- 3 10 17 25

FEB.

PAGE TWO RJEZHQ 401
REQUEST AFBMD REVIEW THE ARMY AND NAVY REQUIREMENTS SPECIFIED IN AMENDMENT NO. 16 TO ARPA ORDER 9-60. AFBMD SHOULD BE PREPARED TO STATE WHICH OF THESE REQUIREMENTS WILL BE SATISFIED BY THE SAMOS AND MIDAS PROGRAMS AND WHICH OF THESE REQUIRE ADDITIONAL DEVELOPMENT EFFORT.
BT
29/2337Z JAN RJEZHQ

WHY NOT AFOAA

WAIT A SEE!

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Transmittal of Discoverer, SAMOS and MIDAS Development Plans

Hq USAF (AFDAT)
Wash 25, D. C.

1. Transmitted under separate cover are five copies each of the following documents:

a. Discoverer Development Plan dated 15 January 1960.

b. SAMOS Development Plan dated 15 January 1960.

c. SAMOS Development/Operational Annex dated 15 January 1960.

d. MIDAS Development Plan dated 15 January 1960.

e. MIDAS Development/Operational Annex dated 15 January 1969.

2. These plans have been prepared in response to Hq USAF guidance [redacted] messages 98212 and 61415) resulting from the presentation of these programs to Hq USAF during 14-16 December 1959.

3. The Discoverer Development Plan. This plan provides for a program of 29 flight vehicles and in accordance with the guidance continues the Discoverer program essentially as previously planned. To accomplish this it has been necessary to use the authorized funding flexibility and allocate to the Discoverer program, \$71.1 millions in FY 1960 and \$15.1 millions in FY 1961. It is recommended that the Discoverer Development Plan and fund allocation be approved.

4. In the case of SAMOS and MIDAS, certain minimum essential additions in excess of the funding ceilings are recommended for consideration and approval.

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a. SAMOS Development Plan. This plan provides for a 25 flight vehicle program and maintains a level of effort consistent with a minimum essential research and development program. The SAMOS program has been allocated within the fund limitations of $160.0 millions in FY 1960 and [redacted]

b. SAMOS Development/Operational Annex. This annex to the development plan has been prepared to define the necessary funding and describe the items of work, equipments, and additional facilities necessary to provide a timely base for a future operational program. The annex is the basis for the transition from a research and development environment into an operational configuration.

c. It is recommended:

(1) That the SAMOS Development Plan and funding allocations be approved.

(2) That the SAMOS Development/Operational Annex be approved as presented. The additions to the SAMOS Program contained in this annex will save valuable time and decrease the overall program costs over the long term.

5. a. MIDAS Development Plan. This plan has been funded within the funds remaining following the funding of Discoverer and the SAMOS minimum essential R&D plan. The amounts remaining for MIDAS are $31.1 millions in FY 60 and $41.0 millions in FY 61. The research and development objective and philosophy have remained unchanged in the plan. However, the impact of this funding rate extends the time schedule of accomplishment of various items of work drastically. This delay of a logical and feasible accomplishment of MIDAS development tasks has required adding to the MIDAS plan a special section (Tab 6, Section 1). This section describes those additional R&D tasks and the costs of same (FY 60, $20.6 millions and FY 61, $65.8 millions) which will permit an increase in the level of effort to raise the program to a minimum essential R&D program. Any program which is less than a minimum essential R&D program will necessarily sacrifice valuable time, reduce efficiency and ultimately add to the overall program costs.

b. MIDAS Development/Operational Annex. This annex defines the funding and describes the items of work, equipments and additional facilities, which when added to the minimum essential R&D program provides a logical base from which a follow-on operational program could be projected. It must be pointed out that consideration should only be given to the MIDAS Development/Operational Annex following an approval of the MIDAS minimum essential R&D program.

c. It is recommended:

(1) That the MIDAS Development Plan, including the additional R&D tasks and associated funding, be approved to permit the continuation of MIDAS at a minimum essential R&D level of effort.

(2) That the MIDAS Development/Operational Annex be approved to insure the timely completion of the essential tasks necessary to provide a basis for a future operational program.

SIGNED
O. J. RITLAND
MAJOR GENERAL, USAF
COMMANDER

Copies to:
ARDC (RDRRB)

ROUGH DRAFT

1 Feb 1960 193

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~~CONFIDENTIAL~~

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FM: AFBMD LOSA CALIF

TO: COFS USAF WASH DC

INFO: ARDC ANDREWS AFB MD

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11 February 1960
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SUGGESTED THORAD/AGENA COMBINATION FOR SAMOS PROGRAM

Approved:
DOUGLAS AIRCRAFT COMPANY, INC.
MISSILES AND SPACE SYSTEMS

G. V. Butler,
Chief Project Engineer
Space Systems Project

R. L. Johnson,
Chief Engineer
Missiles and Space Systems

Approved:
LOCKHEED AIRCRAFT CORPORATION
MISSILES AND SPACE DIVISION

for
E. R. Proctor,
Manager, Program Administration
and Control, Satellite Systems

R. Smelt,
Manager
Satellite Systems

CLASSIFICATION CHANGED
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By Authority of
By AFR 205-1 Date 11 JAN 1966

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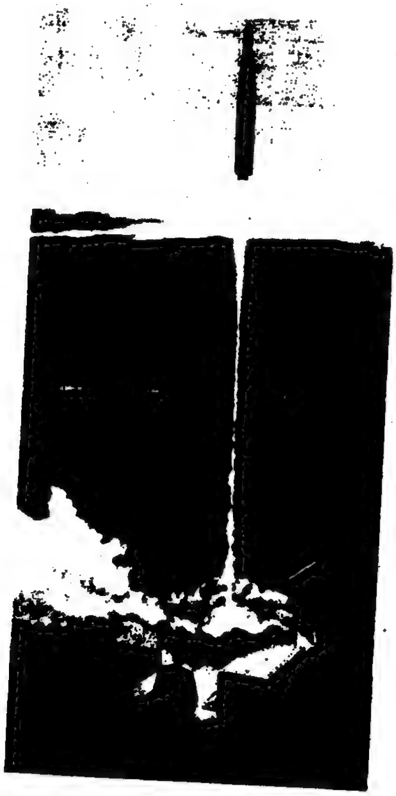

FOREWORD

This presentation of the proposed Thorad/Agena combination for the Samos program has been prepared by Lockheed Missiles and Space Division under the provisions of AF Contract 04 (647)-347, and by Douglas Missiles and Space Systems under Supplemental Agreement No. 15 to AF Contract 04 (645)-65.

This joint report analyzes an alternate program for Samos reconnaissance flights which is based on inclusion of a modified Thor vehicle as a booster, in addition to the Atlas vehicle currently programmed.

The objective has been to increase reliability, reduce costs, and relieve launch pad congestion in a manner which will not prejudice the Samos mission capability. As prime contractor for Samos, LMSD will continue investigations in furtherance of this objective, and submit further recommendations as indicated.

CONTENTS

		Page
FOREWORD		iii
SECTION 1	INTRODUCTION	1
	Present Samos Program	1
	Revised Samos Program	2
SECTION 2	TECHNICAL CONCEPT	5
	Review of Samos Missions	5
	Advanced Thor Capabilities	5
	Thorad A and B Configurations	6
	Thorad Structural Innovations	6
	Thorad Manufacturing and Tooling Requirements	8
	Thorad Solid Propellant Boosters	9
	Thorad Guidance Methods	12
	Thorad Performance	14
	Thorad Ground Support Modifications	16
	Thorad Reliability	19
	Agena Modifications for Thorad Booster	22
	Samos Weight Requirements	26
	Thorad/Agena Performance Capabilities	29
SECTION 3	SCHEDULES	31
	Present Overall Program (LMSD)	31
	Proposed Overall Program (LMSD)	31
	Thorad Program Plan (Douglas)	33
SECTION 4	FUNDING AND COST COMPARISONS	35
	Development Program	35
	Operational Program	35
SECTION 5	CONCLUSIONS AND RECOMMENDATIONS	37

ILLUSTRATIONS

Figure		Page
2-1	Vehicle Configurations with Agena B Second Stage	7
2-2	Solid Propellant Rocket Separation Method	10
2-3	Booster Impact Range for Thorad A	11
2-4	Apogee Velocity Vs. Useful Load for Various Configurations	15
2-5	Thorad Inboard Profile	17
2-6	Thorad A and Agena Burnout Weight Vs. Altitude	28
2-7	Thorad B and Agena Burnout Weight Vs. Altitude	28

TABLES

Table		Page
2-1	Thorad Major Structural Tooling	8
2-2	Thorad Guidance System	14
2-3	Thorad Ground Equipment	19
2-4	Thor Reliability	21
2-5	Thorad A System Comparison	21
2-6	Agena Burnout Weight	27
3-1	Thorad/Agena Samos Flight Schedules	32
3-2	Thorad Program Plan	32
4-1	Funding Comparison, Thorad A/Agena for Samos	36

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SECTION 1

INTRODUCTION

Lockheed Missiles and Space Division has been investigating for some time ways and means to increase reliability, reduce total program costs, insure timely deliveries of boosters, and relieve launch pad congestion on the Samos program. A key approach to achieving these ends involves the utilization of the Thor booster.

Jointly, Lockheed and Douglas Aircraft Companies have explored possible methods to further these objectives. During early November 1959, AFBMD and AFBMC were briefed on an advanced Thor configuration incorporating the Rocketdyne H-1 engine and increasing the propellant tankage. This information was documented in a letter to the Commander, AFBMD, subject "Thor/Agena for Samos," dated 11 November 1959, LMSD-444178 (Secret), and Douglas document SM-36305 (Secret). Joint studies have continued on other advanced versions of the Thor booster with increased thrust and propellant capacity.

This report sets forth a concept of increased Thor propellant tankage, and the use of three solid propellant rockets attached to the engine section of the Thor, to provide increased performance capabilities not previously obtainable.

Section 2 of this report discusses the technical aspects of this new Thor booster concept. Section 3 reviews programming schedules, Section 4 the funding and cost comparisons, and Section 5 the joint conclusions and recommendations of Lockheed and Douglas.

PRESENT SAMOS PROGRAM

The presently planned development program for the Samos system consists of an Atlas boosted Agena vehicle with either a visual (E) or electromagnetic (F) reconnaissance sensor as the payload.

After fabrication, assembly, and checkout at LMSD, the Agena vehicle is delivered to the Missile Assembly Building at Vandenberg Air Force Base where final checkout and servicing is performed. The vehicle is transported subsequently to Launch Complex Number 1 at Point Arguello on the Pacific Missile Range. This complex consists of a single blockhouse which services two launch pads. The Agena is mated to the Atlas booster at the launch pad. After the required countdown procedure, the Atlas/Agena is launched in a southerly direction so that after separation the Agena will be in a nearly circular polar orbit. Circular orbits are required in all cases to adequately perform the prescribed flight objectives. Altitudes of the orbiting Agena vary from 155 to 320 nautical miles depending upon the type of sensor and the mission to be accomplished.

Eighteen launches are programmed for the development program.

Operational flights will follow this R&D program with all launches scheduled from the Pacific Missile Range. Approximately eighteen launches per year will be made with a mix of ferret and visual payloads as required.

REVISED SAMOS PROGRAM

The proposed revision to the Samos program incorporates the use of both the Atlas and Thorad as boosters for the Agena, depending on the type of payload to be carried in the satellite. The flight program encompasses eighteen launches with all payloads and flight dates coinciding with those planned for the present Samos program. Of the eighteen flights, eleven will utilize the Thorad and the remainder Atlas boosters.

The previous Thor/Agena for Samos study indicated that a larger version of the Thor could be used to boost the F_2 and F_3 Ferret payloads. Continued studies now show that an enlarged Thor with solid propellant engines, can be used to boost the E_2 payload in addition to the F payloads. This improved performance Thor has been designated "Thorad." It contains 38,000 pounds additional liquid propellant, and has three 54,500 pound thrust solid propellant rocket engine boosters. Two configurations have been studied: Thorad A, using the Discoverer follow-on 165 K engine; and Thorad B, using a modified 190 K Saturn H-1 engine. Both vehicles have the capability of boosting the E_2 and F payloads, but the Thorad B has an additional performance margin. The use of Thorad A in the Samos program is recommended due to the high reliability and flight test experience gained in previous Thor missile and space vehicle launchings, and in the Little Joe solid propellant booster program. If sufficient funds are available, Thorad B should be introduced to provide greater payload capability.

Launch Complex 75-1, formerly a Thor training complex, and composed of one blockhouse and two launch pads, will be used on the Thorad/Agena program. Only minor modifications to the launch complex will be required to support the Thorad/Agena combination. However, in support of the Agena, a set of Agena ground support equipments must be installed. This includes ground handling, servicing and launch control monitor equipment. No additional Agena checkout equipment will be necessary inasmuch as the existing equipment in the Missile Assembly Building at VAFB can be used.

Those launches scheduled with Atlas as the booster will be made from Launch Complex No. 1 at Point Arguello, PMR, as presently programmed. No modification to the facility or additional ground support equipment will be necessary.

SECTION 2

TECHNICAL CONCEPT

REVIEW OF SAMOS MISSIONS

A variety of payloads are to be placed in orbit as part of the R&D phase of the Samos Program. These R&D payloads include both visual (E-Type) and electromagnetic (F-Type) reconnaissance missions. The payloads are divided into the following configurations:

E_1/F_1 - The first three flights of Samos are dual payloads, powered by primary batteries only, with an operational lifetime of several weeks.

F_2 - An electromagnetic reconnaissance system using digital techniques, with solar power, and launched on a polar orbit at 320 nm altitude.

F_3 - An electromagnetic reconnaissance system using video techniques, powered by solar cells, and launched on a polar orbit at 320 nm altitude.

E_2 - An advanced visual system with high resolution and read-out capability, using solar power, and launched on an 83° retrograde orbit at 261 nm altitude.

E_5 - An advanced visual recovery system with very high resolution, using solar power, and launched on a polar orbit at 155 nm altitude.

ADVANCED THOR CAPABILITIES

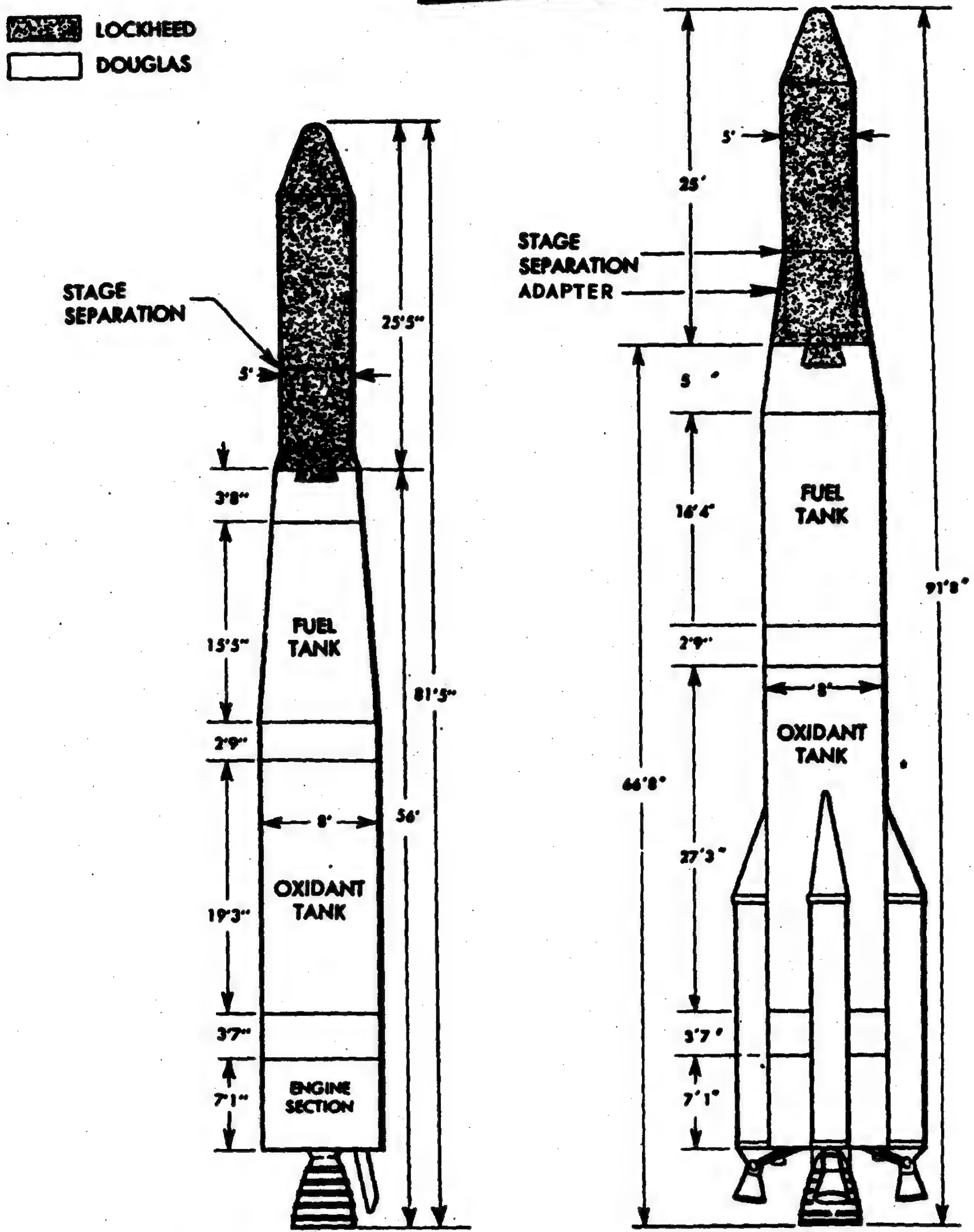
Due to schedule and weight limitations, the first three flights with dual payloads were not considered for this study. As a result of the previous Thor-for-Samos study, it was determined that a Thor with the 190,000 pound thrust H-1 engine and 28,000 pounds additional propellant could be used as a booster for the F_2 and F_3 payloads. This is still a valid conclusion despite weight increases resulting from a change in the solar array configuration. It was also evident, however, that this previous configuration could not be used as a booster for the E payloads due to their larger weight requirements. Continued studies by Douglas and Lockheed now indicate that a Thor vehicle can be developed which is capable of boosting the F payloads and the E_2 payload. By using larger solid propellant boosters, it may also be capable of boosting the E_5 payload.

THORAD A AND B CONFIGURATIONS

The proposed Thorad configuration has an increase in propellant weight of 38, 000 pounds over the present Thor, and uses three 54, 500 pound thrust solid propellant engines which are jettisoned after burnout. Two configurations were studied, Thorad A using the 165, 000 pound thrust Rocketdyne Block II engine scheduled for the Discoverer follow-on flights, and Thorad B using a 190, 000 pound thrust modified H-1 engine developed for Saturn. A comparison of the Thorad A/ Agena and the Discoverer follow-on Thor/Agena is shown in Figure 2-1.

THORAD STRUCTURAL INNOVATIONS

Increased propellant capacity is obtained for Thorad by lengthening the liquid oxygen tank and by replacing the conical fuel tank with a cylindrical container which is essentially a shorter version of the liquid oxygen tank. Because of the simplicity of Thor manufacturing processes, this may be accomplished with no major tank tooling and only minor rework to part of the existing tooling. The larger forward diameter of the Thorad fuel tank will make necessary a new interstage section. A minimum-length transition section between the Thorad and the present cylindrical Agena adapter was found to increase drag and cause an undesirable penalty in burnout velocity because of the abrupt cone angle involved. The conical interstage section and Agena adapter shown in Figure 2-1 will minimize aerodynamic drag.



CONFIGURATION	DM-21	THORAD A
ENGINE	ROCKETDYNE MB3	ROCKETDYNE MB3-BLOCK 2 + THREE THIOKOL XM-33-E2
THRUST	165,000 LBS + 2000 LBS	165,000 LBS + 2000 LBS + 3(54,500 LBS)
GROSS WT	121,191 LBS	189,488 LBS
PROPELLANT WT	98,259 LBS	138,000 + 21,900 LBS
SECOND STAGE GROSS WT	15,750 LBS	17,400 LBS
GUIDANCE	PRESET AUTOPILOT	BTL RADIO COMMAND

FIGURE 2-1 VEHICLE CONFIGURATIONS WITH AGENA B SECOND STAGE

THORAD MANUFACTURING AND TOOLING REQUIREMENTS

A resume of major Thor structural-tooling revision is shown in Table 2-1. The engine section for Thorad A will be that of the existing DM21 with only skin gage and fitting modifications to mount the solid propellant rockets. Thorad B would require a re-design of the engine section. The center body section will be unchanged from the present Thor. The Douglas portion of the new interstage will be an aluminum semi-monocoque structure similar to those used on DM21 and DM18.

Existing dies may be used to form the four 96-inch diameter tank ends, which are identical until they are chemically etched to leave stiffening areas. A minor change here will be the modification of the etch templates used to govern the application of protective wax for areas not to be etched. Also, some modification of weldment fixtures for attachment of vents and outlets to the tanks will be required.

Longer tank skins are obtained merely by purchasing longer sheet stock and machining additional waffles in them. The

TABLE 2-1 THORAD MAJOR STRUCTURAL TOOLING

ITEM	SAME	MODIFIED	NEW	REMARKS
ENGINE SECTION				
AFT CLOSING BULKHEAD JIG		X		SIMILAR TO THOR
MAIN ASSEMBLY JIG	X			
SOLID BOOSTER ATTACH			X	
CENTER BODY SECTION				
MAIN ASSEMBLY JIG	X			
INTERSTAGE STRUCTURE				
MAIN ASSEMBLY JIG			X	
TANK BULKHEAD				
DRAW – FORM DIES	X			
ETCH TEMPLATES			X	
ASSEMBLY WELD FIXTURES			X	
TRIM FIXTURE	X			
TANK SKINS				
WAFFLE TOOLING	X			
WIDTH TRIM FIXTURE		X		REWORK REQUIRED – INCREASE LENGTH OF TANK TRIM FIXTURE
BRAKE PRESS	X			
LO_2 TANK				
PANGBORN SEAM WELDER	X			
SKIN SHELL WELD DOLLY		X		MINOR REWORK ONLY REQUIRED FOR INCREASED TANK LENGTH
MAIN ASSEMBLY JIG		X		REWORK REQUIRED FOR INCREASED TANK LENGTH
HYDROSTATIC CHECKOUT FIXTURE		X		MINOR REWORK ONLY REQUIRED
HYDROSTATIC TEST STAND		X		REWORK REQUIRED FOR INCREASED TANK LENGTH
FUEL TANK				
PANGBORN SEAM WELDER	X			
SKIN SHELL WELD DOLLY		X		MINOR REWORK TO LO_2 DOLLY TO ACCOMMODATE FUEL TANK
MAIN ASSEMBLY JIG		X		REWORK TO LO_2 JIG TO ACCOMMODATE FUEL TANK
HYDROSTATIC CHECKOUT FIXTURE		X		MINOR REWORK ONLY REQUIRED
HYDROSTATIC TEST STAND		X		MINOR REWORK ONLY REQUIRED
FINAL ASSEMBLY				
MAIN ASSEMBLY JIG		X		REWORK REQUIRED FOR LENGTH & SHAPE CHANGES OF TANK
ENGINE JOIN TO TANKS DOLLY	X			

brake press used to form the skins to the required diameter by means of multiple small-angle bends will remain unchanged. Each of the three tank skins used to form a tank wall must be trimmed to a proper width after brake-forming. The fixture used for trimming skins must be increased in length. The Pandjiris seam welder used to make longitudinal tank seams will handle the Thorad oxidant and fuel tanks with no rework, as will the fixtures for attaching tank ends to the skins. Rework of the tank main-assembly jigs and the hydrostatic test equipment will be required because of tank length changes. The final assembly stands will require lengthening to accommodate Thorad.

THORAD SOLID PROPELLANT BOOSTERS

Solid propellant engines will be used to effectively double the first stage thrust at launch. A number of solid propellant rockets were investigated on the basis of cost, availability, and proven performance. The Thiokol XM-33-E2 engine appeared to be particularly outstanding for this application. Three of these engines developed for the NASA Little Joe program will be attached to the thrust structure of the Thorad. This engine is rated at 54,500 pounds thrust at sea level, with a gross weight of 8810 pounds and a propellant weight of 7300 pounds.

Ignition of the XM-33-E2 solid-propellant rockets will be accomplished by ground-powered electrical systems with a sufficient degree of redundancy to insure positive ignition. Ignition timing will be controlled by the main stage signal from the main engine. In the event that one or two of the solids fail to ignite, the vehicle will still lift off the pad. Although the mission could not be completed because of the performance deficiency, it would be desirable to continue flight to a safe region for destruction. Simulated trajectory studies have shown that this is possible if the solid-propellant nozzles are canted to pass thrust vectors near the vehicle cg. Because of the short cg travel of approximately 24 in. during solid-propellant burning, it was determined that a fixed cant angle of 11° would result in less than ±1/2° of main engine deflection to control all cases of failure or variation in burning time during use of the solids. A vernier roll deflection of 21° will be required to cancel out the maximum thrust malalignment of 4 mils. The studies also indicated that the vehicle would clear the launcher under these conditions.

One method for mounting and separation of the solid-propellant rockets is shown in Figure 2-2. A sheet metal structure is bonded along the length of the steel case of the rocket. This structure terminates in a fitting which transmits longitudinal and lateral loads to the vehicle through an actuator mounted on the forward end of the engine compartment. Lateral forces at the rear end of the rocket case are supported by a structure attached to the base of the vehicle. With a separation signal from the autopilot programmer, the actu-

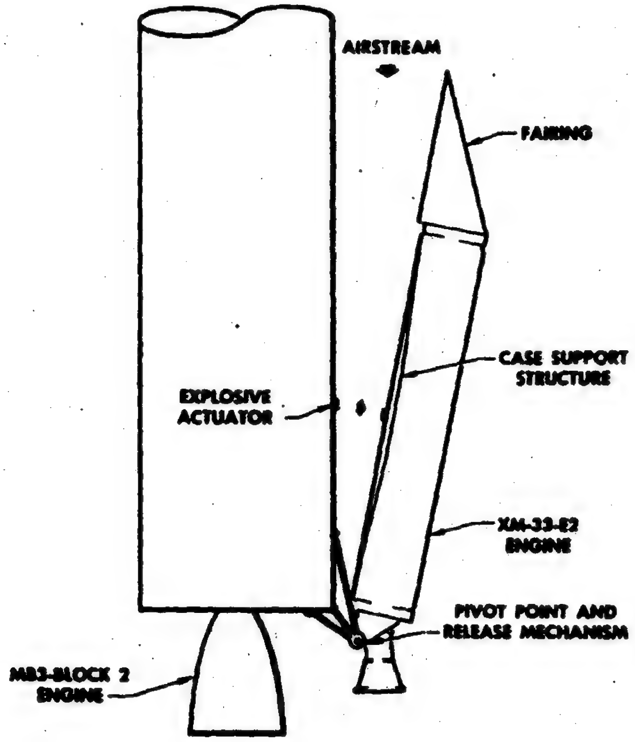


FIGURE 2-2 SOLID PROPELLANT ROCKET SEPARATION METHOD

ator is fired, forcing the empty case to rotate outward from Thorad around a pivot point in the aft structure. Drag on the case and thrust forces from the Thorad engine will accelerate rotation as the angle between Thorad and the empty case increases. At a preset angle, a trip mechanism will release the aft end of the case from the pivot. Rotation will continue, but aerodynamic forces will cause the case to move away from the vehicle. Booster burnout occurs at about 40 seconds of flight at an altitude of 26,000 feet and 3400 feet downrange for the trajectory case studied. Booster separation will be delayed until 90 seconds for 180° launch azimuths when the rockets will impact clear of any land mass as shown in Figure 2-3. For 190° launch azimuths, separation can

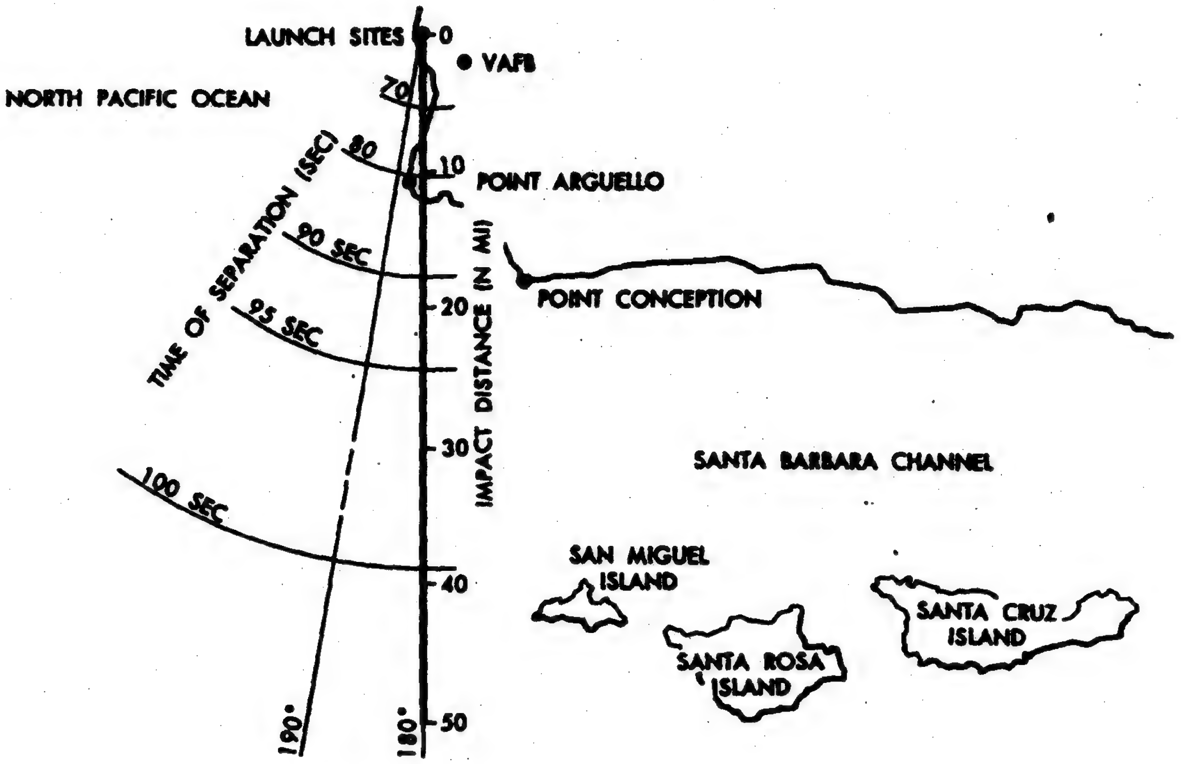


FIGURE 2-3 BOOSTER IMPACT RANGE FOR THORAD-A

be effected at burnout which would compensate for the velocity degradation due to the retrograde orbit. The auto-pilot will be programmed to provide zero lateral acceleration during separation. It is proposed that a wind tunnel program be carried out to investigate aerodynamic forces on the rocket case during separation.

THORAD GUIDANCE METHODS

The present DM-21 Discoverer Thor uses programmed auto-pilot guidance. Corrections are fed to the Agena guidance timer and integrator after Thor burnout through the Agena command system. On Discoverer flights a high Thor apogee is required due to the large altitude dispersion. This results in lower payload weights. The short smoothing time for ground radar computation causes orbit eccentricities greater than desired for the Samos program.

The present Samos program uses the GE guidance system to place the Atlas in a precise transfer orbit with an accuracy of one nautical mile, and within five feet per second of a specified velocity. No corrections are fed to the Agena guidance system during ascent.

To provide maximum payload and to maintain orbit parameters within the present Samos requirements, Bell Telephone Laboratories (BTL) 400 series radio guidance system is proposed for the Thorad. The BTL system has been used in the Thor/Able series, and also guides the Thor and second stage in the Transit Program. The GE guidance system could also be used to guide the Thorad. Both BTL and GE ground stations are favorably situated at VAFB to provide Thorad guidance.

The airborne components of the BTL 400 series radio guidance system are similar to those of the 300 series system to be used in the Thor/Delta series and the Titan missile. The 300 series has been successfully used in six flight tests of the Thor/Able II second stage and has also guided the Thor first stage during the latter part of the first flight of the Transit vehicle. The 400 series equipment is expected to provide greater reliability at lower weight than its predecessor. This has been made possible by transistorizing the receiver and order translator units and repackaging them into a single container. The transmitter beacon is identical with the 300 series unit.

A ten-channel ground station for the BTL equipment has been installed at Vandenberg AFB for use with the Titan program. No change is required in the ground station installation, except for computer digital tapes. The installation is compatible with both 300 and 400 series airborne equipment. This facility is expected to be operating at partial capacity during the Samos program and would require only internal BMD coordination to make it available for Thorad.

The G. E. Mod-III radio guidance system also has been investigated for Thorad and was found to be comparable in accuracy to the BTL system. Airborne equipment weight for this system is comparable with that of the BTL equipment. A G. E. ground station is also located at VAFB and could be made available with BMD coordination of Atlas and Samos requirements.

In the proposed Thorad system, the ground guidance station will transmit commands which are superimposed on the Thorad auto-pilot programmed commands. These signals will be fed to the reference gyros which in turn control the vehicle attitude. Simultaneous main and vernier engine cutoff can be accomplished through the BTL system to provide burnout velocity accuracies of under four feet per second. A comparison of the present DM-21 Thor guidance and the proposed Thorad guidance is shown in Table 2-2. The proposed Thorad method would require no changes in the present Samos/Agena guidance, but would require that a performance margin of approximately 300 feet per second be allowed for a minimum Thorad performance. A way of reducing this performance penalty would be to permit the Thorad to burn to propellant depletion, and reset the Agena guidance timer and integrator from the ground guidance station to the proper values. This would increase the complexity of the system, but would allow the Agena performance margin to be used to compensate for low performance of either stage. Various guidance methods and the penalties involved will require further study to determine the optimum configuration.

TABLE 2-2 THORAD GUIDANCE SYSTEM ACCURACIES

ACCURACIES AT BOOSTER BURNOUT (3σ)	DM-21 (PROGRAMMED AUTOPILOT)	THORAD A (BTL OR GE GUIDANCE)
FLIGHT PATH ANGLE (HALF-ANGLE CONE)	4.5°	0.06°
ALTITUDE	5 N MI IN ANY DIRECTION	5 N MI IN RANGE DIRECTION 0.25 N MI IN ALTITUDE
VELOCITY MAGNITUDE UNCERTAINTY	~500 FPS	4 FPS
TOTAL APOGEE ERROR 100 N MI (3σ)	±31 N MI	±2.0 N MI

FEATURES OF BTL SYSTEM

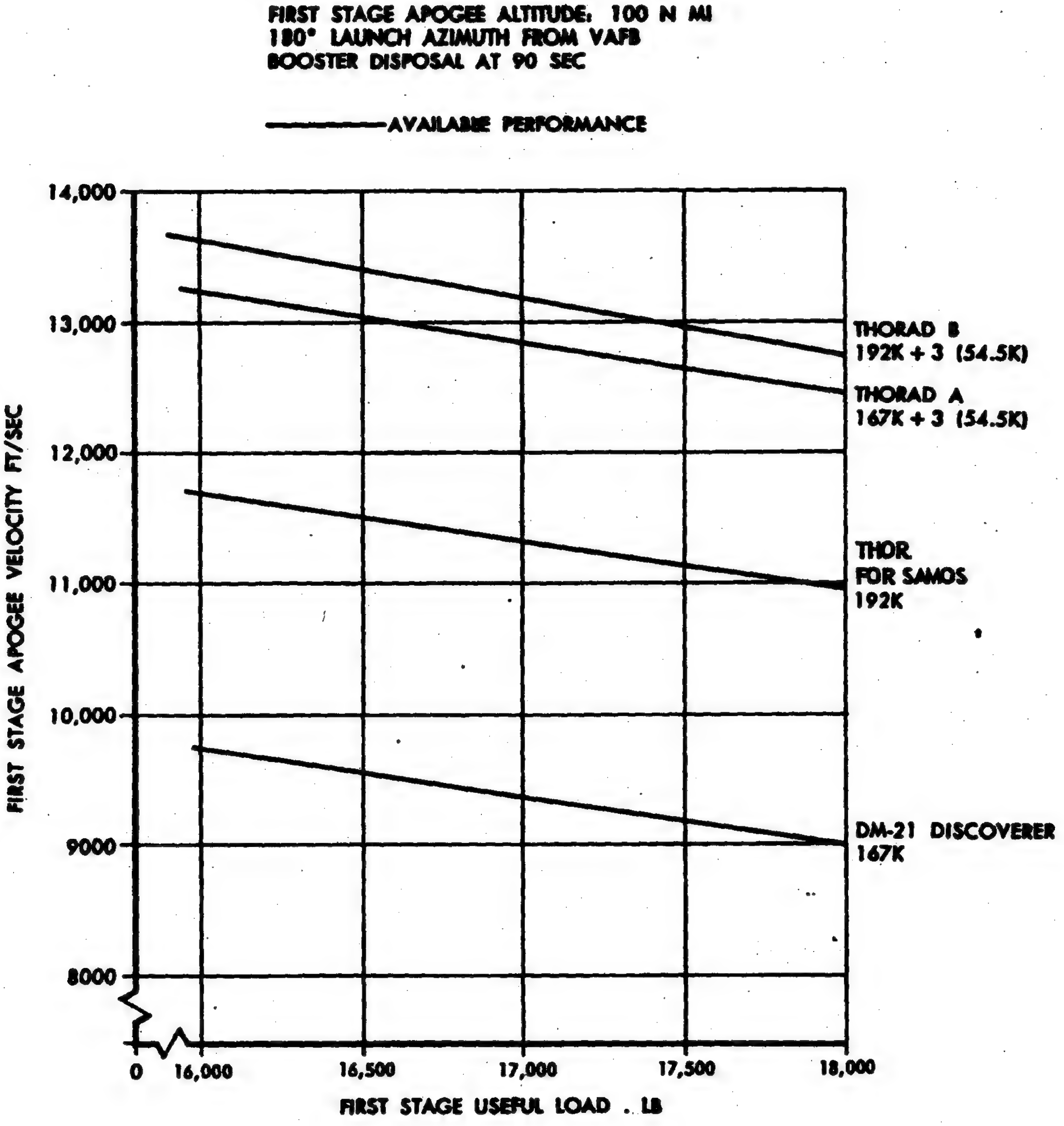
1. FLIGHT PROVEN—HAS GUIDED THOR-ABLE SECOND STAGE
2. LIGHT WEIGHT (56 LBS)
3. EXISTING TITAN GUIDANCE STATION AVAILABLE AT VAFB AND COMPATIBLE WITH EXISTING THOR LAUNCH PADS
4. CONTINUED RELIABILITY TESTING ASSURED THRU USE ON OTHER PROGRAMS (TITAN, DELTA)

FEATURES OF GE SYSTEM

1. FLIGHT PROVEN—HAS GUIDED ATLAS
2. WEIGHT COMPARABLE WITH BTL EQUIPMENT
3. EXISTING ATLAS GUIDANCE STATION AVAILABLE AT VAFB AND COMPATIBLE WITH EXISTING THOR LAUNCH PADS

THORAD PERFORMANCE

First stage burnout velocity vs payload weight for the various Thor and Thorad configurations is shown in Figure 2-4. It can be seen that the Thorad A provides a velocity 1500 feet per second greater than that indicated by the previous "Thor for Samos" study, and 3500 feet per second greater than the present DM-21 Discoverer Thor. Even greater velocity increases are possible with the Thorad B using the 192,000 pound thrust engine. An inboard profile of the Thorad/Agena vehicle combination is shown in Figure 2-5.



FIRST STAGE APOGEE ALTITUDE: 100 N MI
180° LAUNCH AZIMUTH FROM VAFB
BOOSTER DISPOSAL AT 90 SEC

FIGURE 2-4 APOGEE VELOCITY VS. USEFUL LOAD FOR VARIOUS CONFIGURATIONS

The Thorad B engine is a modification of the Rocketdyne H-1 engine being developed for the Saturn program by NASA. This engine has already undergone extensive static firings and is presently in the preliminary flight rating test phase (PFRT). This engine is the evolution of earlier Rocketdyne 150,000 pound thrust engines, and has obtained the higher thrust by increasing the power of the turbine and mounting it directly on the gimballed thrust chamber. By the elimination of many engine starting circuits, a simpler and more reliable engine has been produced. The changes required for use with the Thorad include a simplification of the turbine exhaust system and the addition of vernier engines. This engine for Thorad B has been designated D5-V5 by Rocketdyne.

A Thorad configuration using three 120,000 pound thrust solid propellant engines was also investigated. These engines are presently being developed for the NASA Scout program. Approximately 2000 feet per second additional velocity is obtained over the Thorad A configuration with minimum booster modifications being required. This vehicle has possible application to the Samos E_5 flights.

THORAD GROUND SUPPORT MODIFICATIONS

Thorad ground support modifications required for the use of PMR training sites 75-1-1 and 75-1-2 of the Samos program are shown in Table 2-3. Other than the known modifications to convert these facilities to Samos sites, the Thorad changes shown would consist mainly of relatively minor modifications in length of the various items of handling and servicing equipment and in the structure which shelters the missile while in a horizontal position, plus the provision of blast deflectors for the launcher. The RIM (Receiving, Inspection and Checkout) building extension, which is presently used exclusively for Discoverer, will be capable of housing Thorad activities.

The Thorad will require additional handling and checkout equipment for the solid propellant rockets, which will be installed on the vehicle after final erection for flight. A crane will be used to place each solid propellant motor horizontally in a fixture attached to the launcher. This fixture will pro-

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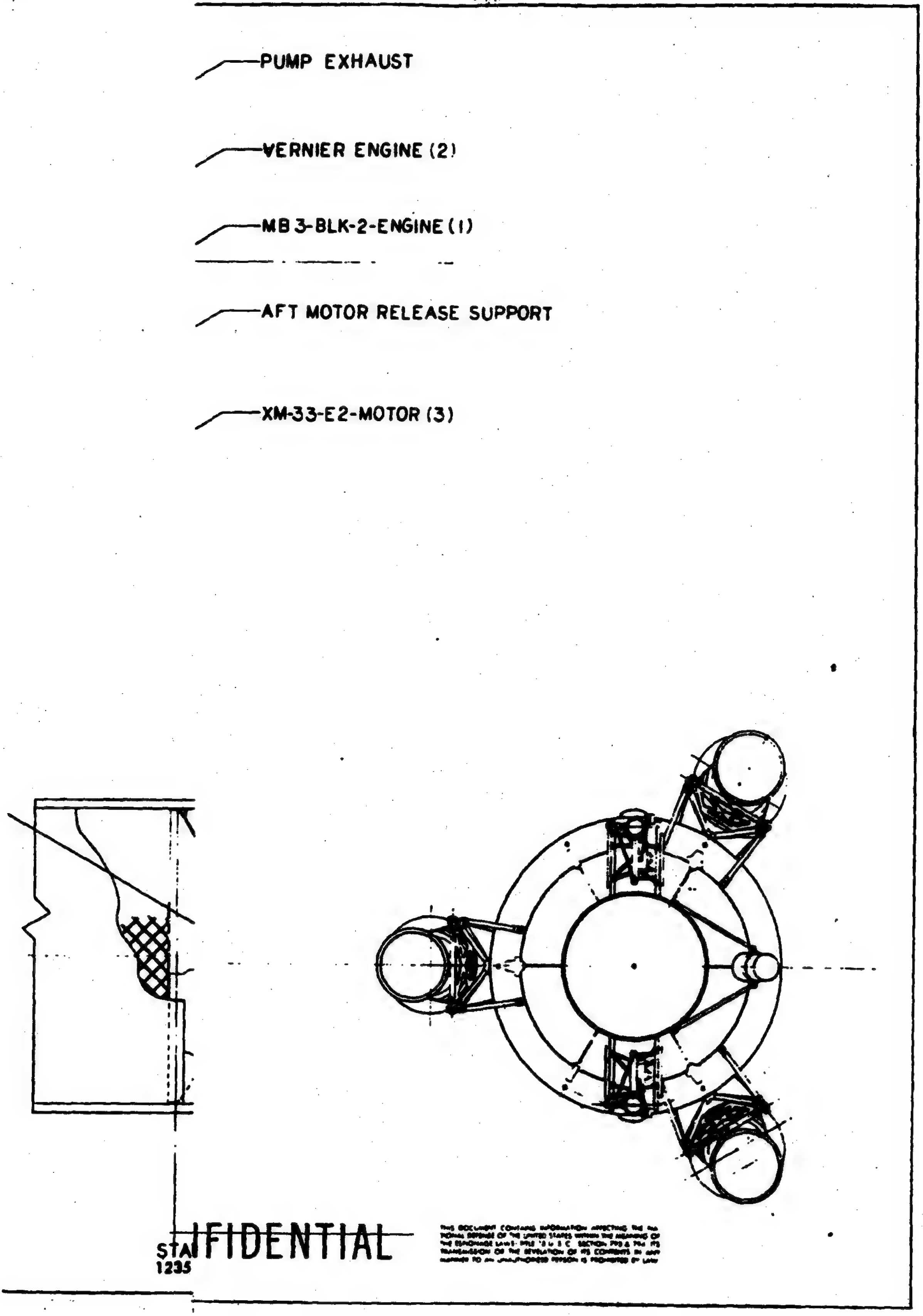

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IGURE 2-5 ~~THORAD INBOARD~~ PROFILE

638

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vide precise control in moving the aft end of the rocket to a mating position with the aft mount on the Thorad engine section. After mating, the rocket will be elevated to a vertical position to make contact and permit attachment with the forward thrust fitting. After all rockets are installed and aligned by optical boresighting to within one mil of the booster centerline, the fixture will be removed from the launcher.

TABLE 2-3 THORAD GROUND EQUIPMENT

ITEM	SAME	MODIFIED	NEW	REMARKS
LAUNCH EMPLACEMENT				UTILIZATION OF TRAINING SITES WILL REQUIRE LAUNCH EMPLACEMENT MODIFICATIONS TO 1171 CONFIGURATION PLUS MODIFICATIONS BELOW
SHELTER		X		ADDITION OF 8 FT BAY
SHELTER RAILS		X		ADDITION OF 8 FT RAILS
TRANSPORTER/ERECTOR		X		LENGTHENED BY ADDITION OF 9 FT SECTION NEAR AFT END. ADDITION OF CAP-PLATES. NEW FORWARD CLAM SHELL.
LAUNCHER		X		ADD BLAST DEFLECTORS FOR SOLID PROPELLANT ROCKETS
UMBILICAL MAST		X		ADDITION OF A 9 FT SECTION WILL BE REQUIRED TO LENGTHEN MAST
LO_2 FILL MAST	X			
FUEL FILL MAST	X			
SOLID-PROPELLANT ROCKETS			X	PROVIDE HANDLING & CHECKOUT EQUIPMENT
FACILITIES & REVETMENTS	X			
FWD UMBILICAL PLUG CARRIER		X	X	A NEW PLUG CARRIER IS RECOMMENDED ALTHOUGH THE ORIGINAL ONE COULD BE MODIFIED
RIM BLDG	X			PRESENT 1171 RIM BUILDING ADEQUATE
SHIPPING EQUIPMENT				
SHORING	X			
TRANSPORTER	X			

THORAD RELIABILITY

A prime objective for Thorad A is the continuation of the record of reliability associated with Thor, both as a tactical missile and a booster for other vehicles. This record is tabulated in Table 2-4. The tactical program, which includes the higher failure rates of early development, shows that 40 out of 58 attempts were successful. Of greater significance to Samos may be the 20 out of 23 successful special-project boosters also shown. The total score for the two groupings is 60 successes in 81 launchings. An arbitrary choice of a sample consisting of the last 57 firings shows that 49 of these, or 86%, were successful. This information is based on failures in those functions attributable to a space-vehicle booster. It is proposed to maintain this high level of dependability for the Samos program by the use of basic Thor subsystem components wherever possible, by the use of well-developed new or modified components and by adequate ground test of the latter components.

Reliability of the XM-33-E2 solid propellant booster engine is assured through continued use on the Little Joe project. To date 35 grain castings have been completed by Thiokol without a defect. Of these 9 have been successfully fired in a static testing program; 4 have been successfully flight tested on the Little Joe project, and 4 more are planned for flight testing on the next Little Joe launch. Comparisons of Thorad A subsystems with those of the DM-21 Discoverer Thor are shown in Table 2-5. The reliability evidenced by the Rocketdyne engine and the predecessors from which it was derived in combination with Douglas installation and operating experience with this engine should result in relatively high Thorad propulsion reliability.

Structural modifications for the Thorad A are not expected to cause any deterioration of reliability. Many parts in the modified sections will be identical or similar to existing parts.

Hydraulic system changes are in the nature of deletions which will simplify the configuration and improve reliability. Since vernier engine operation after main engine cutoff is not required for Samos, the vernier engines will be actuated in roll only. The vernier yaw actuators along with their associated plumbing and the yaw trunnions will be removed from the vehicle. Pitch and yaw will be controlled by main engine movements.

Revision of the autopilot will consist in part of simplification by removal of vernier pitch and yaw circuits. Minor changes in resistors and capacitors of shaping networks and

TABLE 2-4 THOR RELIABILITY

1. CURRENT THOR BOOSTER RECORD	LAUNCHES	SUCCESSFUL BOOST
TACTICAL THOR DEVELOPMENT PROGRAM	58	40
SPECIAL PROJECT BOOSTERS		
DISCOVERER PROGRAM	9	8
ABLE (RTV)	3	2
ABLE-1 (LUNAR)	3	2
ABLE II (RTV)	6	6
ABLE-3 (SATELLITE)	1	1
TRANSIT (SATELLITE)	1	1
	23	20
TOTAL RECORD	81	*60

* 49 OUT OF LAST 57 SUCCESSFUL

2. THORAD A BOOSTER BASED ON PROVEN COMPONENTS UTILIZING THOR EXPERIENCE
   1. WELL DEVELOPED MB3 BLOCK 2 ENGINE
   2. MAXIMUM USE OF BASIC THOR SUB-SYSTEM COMPONENTS
   3. ADEQUATE GROUND TEST OF NEW FEATURES
   4. CONTINUING ENGINE AND GUIDANCE RELIABILITY TESTING ON OTHER PROGRAMS

TABLE 2-5 THORAD-A SYSTEM COMPARISON

SUB-SYSTEM	REMARKS
● PROPULSION	DM-21 ENGINE SAME VERNIER ENGINES REVISE FOR ATTACHMENT OF. SOLID PROPELLANT ROCKETS
● STRUCTURE	IDENTICAL STRUCTURAL METHODS & MATERIALS (MANY STRUCTURAL COMPONENTS ARE IDENTICAL e.g. FRAMES, BULKHEADS, FITTINGS, STRINGERS, ETC. CONSTANT-DIAMETER FUEL TANK. LENGTHENED FUEL & OXIDIZER TANKS. ENGINE SECTION REVISED FOR ATTACHMENT ADDITIONS OF SOLID PROPELLANT ROCKETS. REVISED INTERSTAGE SECTION.
● HYDRAULICS	IDENTICAL POWER SUPPLY, VERNIER ROLL ACTUATORS & MAIN ENGINE ACTUATORS. VERNIER YAW ACTUATORS REMOVED
● AUTOPILOT	IDENTICAL COMPONENTS WITH VERNIER PITCH AND YAW ELECTRONICS REMOVED
● POWER SUPPLY	IDENTICAL TO DM-21
● COMMAND DESTRUCT	IDENTICAL TO DM-21
● GUIDANCE	BTL-400 SERIES OR GE MOD III RADIO COMMAND SYSTEM – USED FOR TITAN AND THOR-DELTA. FLIGHT PROVEN IN ABLE RTV & TRANSIT

in compatibility circuits for the BTL guidance will also be required. Mechanical components in the autopilot will remain unchanged.

The electrical power supply and the command-destruct subsystems will be unchanged from the present Thor.

Additional weight savings and improved performance are available for Thorad A by using the Douglas lightweight autopilot and solid state inverter presently used in other Douglas space programs.

AGENA MODIFICATIONS FOR THORAD BOOSTER

The high payload capacity of the Atlas/Agena makes possible the inclusion of large amounts of redundant and back up equipment on the Samos program. The major Agena differences between the present Atlas-boosted program and the proposed Thorad-boosted program are the inclusion of dual burning and the elimination of over 500 pounds of primary batteries and 200 pounds of redundant equipment. In no way are the flight objectives compromised by the elimination of essential equipment. Sufficient excess equipment and instrumentation is included in all cases to insure that satisfactory results will still be obtained in the event of below nominal performance by any of the subsystems. The changes to the present Samos/Agena are described below.

Subsystem A (Airframe)

The Agena vehicle airframe subsystem consists of the nose cone assembly, forward midbody assembly (including the forward equipment rack), propellant tanks, aft midbody assembly, aft equipment rack, and the adapter assembly. The propellant tanks are of integral design and are placed between the forward midbody assembly and the aft midbody assembly. For this program the tanks are sized to provide twice the impulse propellant available in the current Agena vehicles.

The airframe carries and supports the equipment required to accomplish the flight mission, provide the necessary environmental protection, structural integrity, and alignment.

During the coast period of the exit phase of the flight, the vehicle separates from the adapter which remains attached to the forward end of the Thor booster. During this same coast period the vehicle nose cone will be ejected from the forward body in order to improve performance during the Agena burning phases.

The vehicle structural changes required to accommodate the Agena to the Thorad booster are confined to the nose cone and forward midbody and to the booster adapter. In the nose cone it will be necessary to increase the skin gauge to counteract the effects of higher dynamic pressure during the boost phase. The change in the forward body is not attributable directly to the booster, but to the deletion of the large primary batteries which were included in the Atlas-Samos vehicles as an emergency power source in the event of total failure of the solar power system. Deletion of these batteries permits the deletion of the short auxiliary equipment bay located between the nose cone and forward midbody. The new adapter section for attachment of the Agena to the Thor will consist of a constant angle conical frustum with internal provisions for separation of the Agena at the end of the ascent boost. Materials and design techniques will reflect the experience gained in the design and operation of existent Agena-Thor booster adapters. Preliminary loads analyses have indicated the possibility of a marginal condition in the vehicle propellant tanks on the Thorad B flights, however, this will not require a structural change because of the impending reduction in pressure in the tanks. The use of the Bell Model 8096 engine with pump inducers permits a reduction in tank pressure below the level used in the tank design. To date the tank regulators have not been redesigned to reflect the lower requirement, but prior to the time when the Thorad B would be used this change will have been incorporated.

Subsystem B (Propulsion)

The propulsion system consists of the rocket motor and turbopump assembly, propellant plumbing, and propellant pressurization system.

The rocket motor and turbine pump assembly consists of a single-chamber liquid rocket motor with nozzle expansion ratio of 45:1; a turbine pump assembly including gas generator, turbine, and gear box; and oxidizer and fuel pumps. The engine-pump assembly for this program will be the Bell Model 8096, a later model of the Model 8048 engine now in use in the Discoverer program. The 8096 is under development for Discoverer and will be flown in that program prior to introduction into Samos. Changes introduced in the 8096 include a higher expansion ratio nozzle, an improved injector, enlarged cooling passages, and modified engine controls for an orbital re-start capability for dual-burn flight performance.

The propellant pressurization system consists of two pressure vessels; helium gas; and plumbing, valves, and regulators for maintaining pressure in the propellant tanks. The ullage control function is provided by small solid propellant rockets mounted on the aft equipment rack or, on those vehicles incorporating the secondary orbit-adjust propulsion system, by burning a small part of the propellants in this system prior to each ignition of the main engine.

The only propulsion system change for the Thorad program is the use of the dual burn technique, not required on the Atlas flights due to their higher payload capability. This does not require any hardware modifications.

Subsystem C (Auxiliary Power System)

Primary electrical power is supplied to the Agena vehicle by extendible solar cell array. The array consists of two plane surfaces which are folded during ascent and erected following boost. After erection the arrays will be adjusted about their longitudinal axis to compensate for the seasonal change of the orbit. Rotation of the arrays will be accomplished by a self-contained sensing and actuation system. Nickel-cadmium secondary batteries supply power for peak loads and during the portion of time that the satellite is within the earth's shadow.

Static devices are used to convert the 28v dc power into 400 cps single and three phase ac power, 2000 cps three phase ac power, and to provide regulated plus and minus 28v dc power.

The reliability of the APU system has been increased beyond that proposed in the previous Thor-for-Samos study by use of rotation about one axis only. This necessitated an increase in the size of the solar array and the inclusion of additional secondary batteries. The duplicate inverters proposed previously have been retained in this study.

The only change from the present Atlas boosted flights is the deletion of five primary batteries.

Subsystem D (Guidance and Control)

The principal elements of the Agena guidance system are: an integrating accelerometer, a gyroscopic angular reference, a horizon scanner, and a timer. The attitude control system is a combination wheel-gas system for control during the coast periods of the ascent trajectory, vehicle reorientation after burnout, and for orbit attitude control. Pitch and yaw control during engine burning is obtained by swiveling the Agena engine.

For the present Atlas-boosted Samos flights, the GE guidance system cuts off Atlas thrust at a desired velocity. The Subsystem D timer then separates the Agena and fires the engine at boost apogee. On dual burn flights, the timer would reset the integrator and fire the engine a second time at apogee of the transfer ellipse. No guidance commands are transmitted to the Agena during ascent. The use of the BTL guidance system in Thorad would require no changes in the Agena guidance system if Thorad velocity cutoff were used and would provide the same accuracies as presently obtained with the Atlas guidance system. In the event that the Thorad were allowed to burn to exhaustion, provisions would have to be made so that commands could be sent via the BTL radio link to reset the Agena timer and integrator to the computed values. This would permit a better utilization of the Thorad/Agena capabilities, with a possible increase in payload.

Subsystem H (Ground-Space Communications and Instrumentation)

Communications. A UHF communication subsystem provides the means for transmitting coded data from the reconnaissance payload, and commanding programming and checkout of the vehicle equipment. A narrow band UHF transmitter with omnidirectional antenna is incorporated into all vehicles for transmission of instrumentation data, and in the F-2 vehicles for reconnaissance data also. On the E-2 and F-3 vehicles the transmission of reconnaissance data is accomplished by means of a UHF wide band transmitter and directional antenna. On the F-2 and F-3 vehicles duplicate data links are included to increase reliability throughout the long design operational lifetime. On the data readout systems of E-2, F-2, and F-3, a solid state timer provides timing pulses for the sequence programmer and the data recorders. The vehicle receiver is activated by the programmer as it approaches a ground station, and commands are received and decoded. Real time commands to check out the operation of the vehicle are executed immediately, and stored time commands to program the reconnaissance subsystems, are stored in the sequence programmer. On the E-5 vehicles, where the photographic data are obtained by physical recovery of the payload capsule, the timer and sequence programmer are replaced by a command programmer.

Instrumentation. During early R&D flights of the Samos program a unitized FM/FM telemeter will be included to transmit information regarding the internal functions of the various subsystems during ascent and orbit. A tape recorder is included to store data when the vehicle is not in the vicinity of a readout station. This system will provide backup for the UHF telemetry equipment which is included in all vehicles. All VHF equipment will be deleted prior to initiation of the operational Samos program. In the UHF system data will be sub-multiplexed on the data link multiplexer for both real time and delayed (taped) transmission.

SAMOS WEIGHT REQUIREMENTS

The required burnout weights for various Samos missions are shown in Table 2-6. The weights have increased from those shown in the previous Thor for Samos study due to the change in solar array requiring larger area and additional secondary battery capacity. Provision for orbit adjust system is also included in the E-5 and F payloads, although this is not presently funded. Operational versions of the E-2 payload will also have orbit adjust systems; however, elimination of the FM telemetry, and reductions in propellant tank and E-2 weights will result in a similar weight for the operational version. Operational weights of the F payloads should be somewhat lighter than those shown.

TABLE 2-6 AGENA BURNOUT WEIGHT

	E-2	F-2	F-3	E-5
STRUCTURE	(680)	(702)	(680)	(678)
PROPULSION	(448)	(614)	(614)	(563)
PRIMARY PROPULSION	448	402	402	403
ORBIT PERIOD ADJUST SYSTEM	—	170	212	160
CONTROLS-INCLUDING ON-ORBIT ATTITUDE CONTROL	107	189	189	227
GUIDANCE	141	141	141	156
AUXILIARY POWER UNIT	773	844	844	669
EXTENDABLE SOLAR ARRAY	338	338	338	292
SOLAR BATTERIES	189	252	252	126
INVERTERS, REGULATORS, AND WIRING	246	254	254	251
COMMUNICATIONS	(522)	(402)	(616)	(260)
DATA LINKS, TELEMETERS, PROGRAMMERS, RECORDERS, AND INSTRUMENTATION	337	341	431	246
ANTENNAE	185	61	185	14
RESIDUAL PROPELLANTS AND GASES	(146)	(146)	(146)	(146)
PAYLOAD	(995)	(412)	(350)	(2294)
VISUAL RECONNAISSANCE	995			1567
FERRET		412	350	
MIRROR CAMERA				150
RETRO-IMPULSE PROPELLANTS				577
BURNOUT WEIGHT	3812	3450	3580	4993

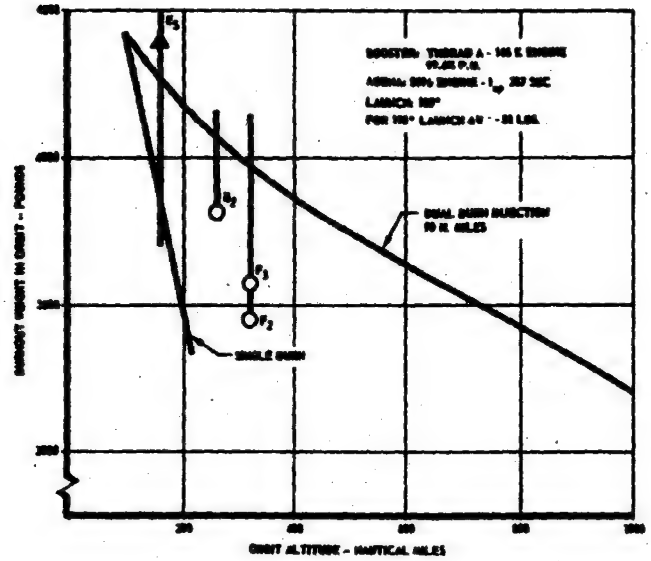


FIGURE 2-6 THORAD-A AND AGENA BURNOUT WEIGHT VS. ALTITUDE

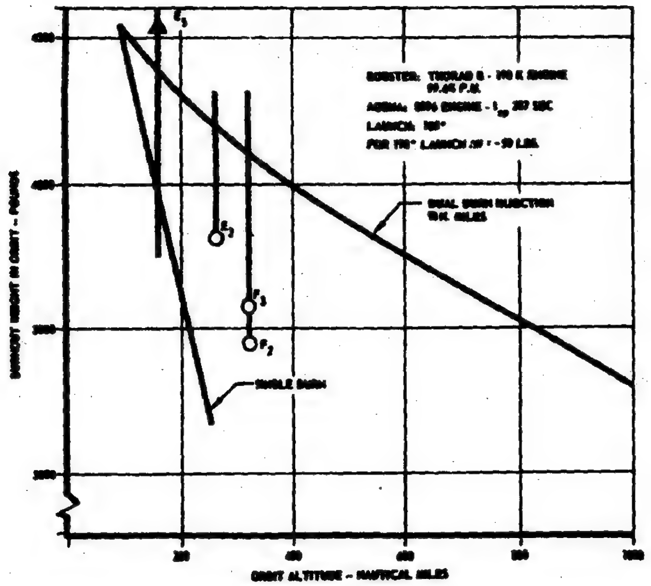


FIGURE 2-7 THORAD-B AND AGENA BURNOUT WEIGHT VS. ALTITUDE

THORAD/AGENA PERFORMANCE CAPABILITIES

The performance capability of the Thorad/Agena is shown in Figures 2-6 and 2-7. It can be noted that duel burning is required for all Samos missions. The dual-burn injection altitude is assumed to be 90 nautical miles, which is reasonable using the BTL guidance system. Injection altitudes as low as 80 nautical miles have been studied and found to be practical. The curves have been plotted using Thorad data which retained the solid propellant engines for 90 seconds. For launch azimuths of 190° required by the E-2 payloads, the engines can be dropped at the end of 40 seconds which will negate the 50 pound loss due to the retrograde orbit. A minimum performance margin of 100 pounds is usually required to assure orbit capability. It can be seen that the performance margin for the Thorad A is in excess of 200 pounds for the most critical case, E-2. The higher performance Thorad B with the 190 K thrust engine provides an additional 100 pounds above this value.

The E-5 payload is well beyond the capability of either Thorad configuration. The use of a Thorad with 190 K engine and three 120,000 pound thrust solid propellant engines considerably increases the payload capability, but it still lies several hundred pounds below that required by the E-5. Revisions in the E-5 system may permit launching of the E-5 payload by this Thorad configuration.

SECTION 3

SCHEDULES

PRESENT OVERALL PROGRAM (LMSD)

The present Samos program consists of eighteen development flights of which the first three carry dual payloads of the E-1 and F-1 sensor types. Of the remaining fifteen flights, ten will carry a visual sensor (E type) and the remainder will include a ferret payload (F type). The first development flight is scheduled for April 1960 followed by the operational program which will commence in January 1963 and continue at a rate of eighteen launches a year.

All launches are scheduled from Launch Complex Number 1 at Point Arguello, PMR, and will utilize Atlas as the booster.

PROPOSED OVERALL PROGRAM (LMSD)

Assuming 1 March 1960 as the authorized date to proceed with the Thorad/Agena concept, all proposed flight dates will coincide with the existing programmed flight dates. No slippage, modification or revisions of scheduled launches will be necessary.

Eleven of the eighteen development flights will use a Thorad as the booster. The only Agena vehicles that cannot achieve the required orbit utilizing the Thorad as the booster are those which carry a dual E-1/F-1 or E-5 payload. Those vehicles incorporating a dual or E-5 payload, seven in number, will be launched with Atlas as the booster from Launch Complex Number 1 at Point Arguello, PMR as presently programmed. Table 3-1 depicts details of this flight program.

TABLE 3-1 THORAD/AGENA SAMOS FLIGHT SCHEDULES

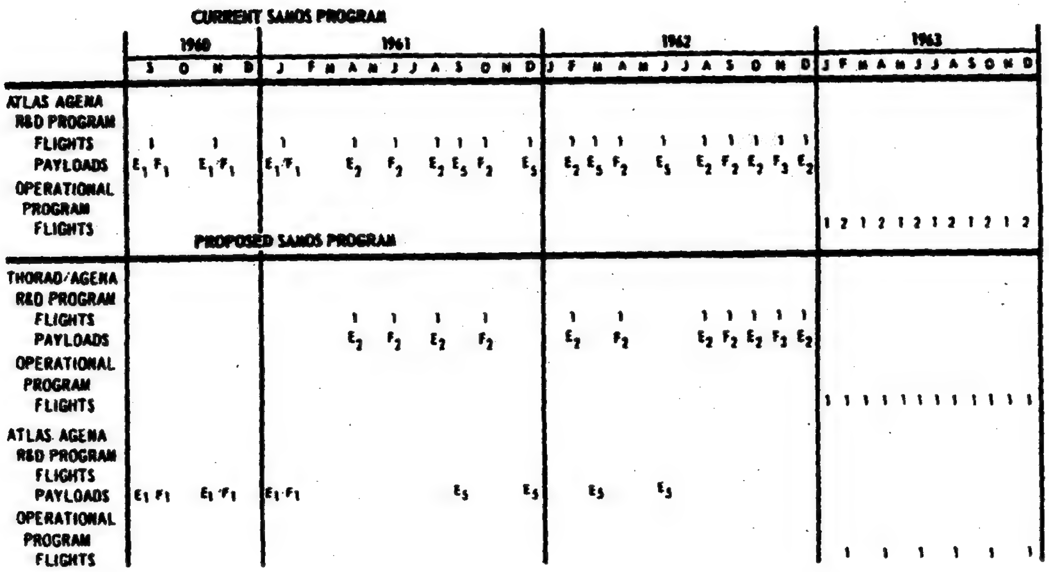
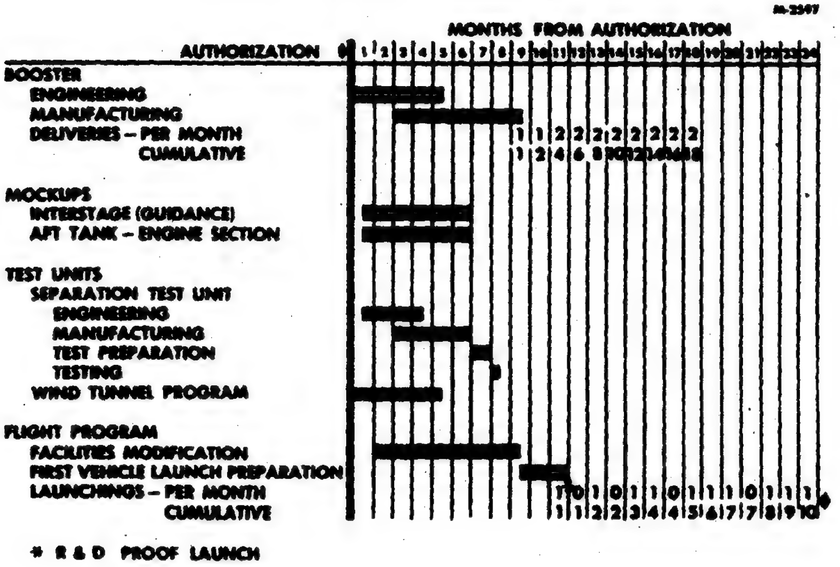


TABLE 3-2 THORAD PROGRAM PLAN



* R & D PROOF LAUNCH

THORAD PROGRAM PLAN (DOUGLAS)

A launch capability eleven months from authorization is the key objective of the schedule proposed in Table 3-2 for the new Thorad booster. The design, test and manufacturing phases are based on proven Douglas performance and thorough coordination with the various subcontractors.

Wind tunnel investigations, booster rocket separation tests, and one-round flight test program are shown in the center portion of Table 3-2. The period shown for the wind tunnel effort includes design, fabrication, and instrumentation of models, as well as planning, conducting and evaluating the tests. Ground tests to investigate solid-booster-rocket separation dynamics are scheduled for the Douglas Santa Monica location.

The single flight-test round is to be flown in 11 months at VAFB in order to permit maximum feedback of test data to the development of the operation vehicle. The first Samos R&D flight will occur in 13 months, and is shown as the second Thorad launch in Table 3-2. Use of the proven propulsion system components of the MB-3 block-2 engine precludes any requirement for a special static or captive test firing program. The lower section of the table indicates the modifications of the VAFB launch facilities at Launch Complex 75-1 which is composed of one blockhouse and two launch pads.

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SECTION 4

FUNDING AND COST COMPARISONS

DEVELOPMENT PROGRAM

Table 4-1 indicates a savings of $850,000 through fiscal year 1963 over the present program for eleven Thorad A/Agena flights, including design, testing, ground support equipment, airborne equipment and required modifications to facilities. Assuming an authorized go-ahead of 1 March 1960, $3,950,000 would be required for the remainder of fiscal year 1960. During fiscal year 1961 an additional $1,250,000 would be required. However, during the two succeeding years a savings in the amount of $6,050,000 could be experienced.

Although additional monies are required to design, modify and purchase ground support equipment as well as design the Thorad A and provide Agena modifications it is significant to note that for every Thorad A launched in lieu of an Atlas, a savings of $1,250,000 results. This assumes civilian personnel will be responsible for, and participate in, all development launches at VAFB.

If consideration were given to the use of the D5-V5 Rocketdyne engine on the Thorad B, an additional $8,300,000 would be necessary to develop the engine and make necessary modifications to the Thorad vehicle.

OPERATIONAL PROGRAM

To convert Launch Complex 75-1 to operational use, it is assumed that fully automatic ground support equipment will be required for Agena operations. Under these conditions, Agena costs would increase by $8,500,000 which includes the installation of the equipment. Thorad equipment at the

Complex is considered operational at the present time and therefore no additional funding would be required for conversion.

During the operational program it is assumed that military personnel will be operating the entire launch complex. Under these conditions, every Thorad that is used as a booster in lieu of an Atlas would result in a net savings of [redacted] a launch, or [redacted] annually.

All cost data presented are approximate.

TABLE 4-1 FUNDING COMPARISON, THORAD-A/AGENA FOR SAMOS

SERIES	ITEM	FY 60	FY 61 (000)	FY 62	FY 63	TOTAL
100	AIRBORNE HARDWARE					
	SAMOS VEHICLE (11)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	ATLAS BOOST (11)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	THORAD A (11)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	TOTAL, SERIES 100	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
200	GROUND SUPPORT EQUIPMENT					
	AGENA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	THORAD A	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	TOTAL, SERIES 200	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
600	RESEARCH AND DEVELOPMENT					
	AGENA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	THORAD A	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	TOTAL, SERIES 600	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	NET COST DIFFERENCE	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

AGENA GROUND SUPPORT EQUIPMENT [redacted]

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

1. The Thorad A configuration using Bell Telephone Laboratories Series 400 guidance, the Rocketdyne 165 K engine, 38,000 pounds additional liquid propellants, and three Thiokol 54.5 K solid propellant rocket engines is sufficient to boost the E_2, F_2, and F_3 payloads. Reliable flight-proven components are used throughout.

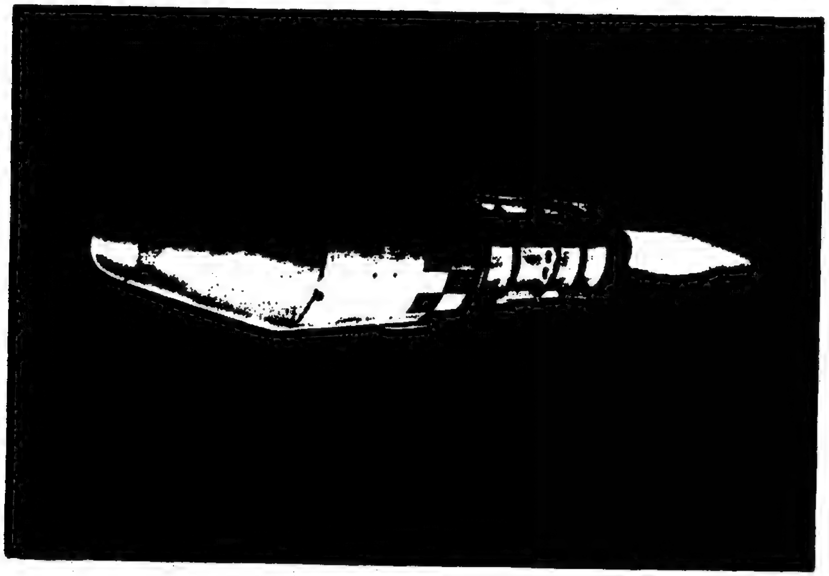
2. The Thorad B configuration provides greater payload margin, but requires additional booster modifications and static testing.

3. No schedule difficulties are encountered by introducing the Thorad into the Samos schedule.

4. It is recommended that Thorad A be used on all Samos E_2, F_2, and F_3 flights.

[redacted]

~~CONFIDENTIAL~~



[redacted]

DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

~~CONFIDENTIAL~~

[redacted]

~~SECRET~~

IC-1
WP
IC 152

15 FEB 1960 21 44
WDL

INFO: WDGE
WDTE
WDZE
WDC
WDGV

[illegible]
[illegible] RJWEBK
[illegible] RJEZHQ 371
[illegible] R 152377Z
[illegible] HQUSAF
[illegible] RJEZFF/ARDC ANDREWS AFB MD
INFO RJWEBK/AFBMD LOS ANGELES CALIF
RJWZBR/SAC OFFUTT AFB NEBR
RJEDSQ/AMC WPAFB OHIO
RJWFAL/ADC ENT AFB COLO
BT
//~~S E C R E T~~/AFDAT 78783
THIS MESSAGE IN THREE PARTS. PART I. THE AFBMC HAS APPROVED THE
DEVELOPMENT PLANS FOR DISCOVERER, SAMOS AND MIDAS DATED 15 JAN 60
AND PRESENTED TO THE AFBMC ON 10 FEB 1960, INCLUDING THE MINIMUM
ESSENTIAL R&D PROGRAMS AND THE DEV/OPS ADD-ONS FOR SAMOS AND MIDAS
HOWEVER, IMPLEMENTATION OF THESE PLANS MUST AWAIT APPROVAL OF DDR&E
PART II. PENDING APPROVAL OF THESE PLANS BY DDR&E, THE ARDC IS
DIRECTED TO TAKE THE NECESSARY ACTION TO PROTECT THE SCHEDULES AND
INTEGRITY OF THESE PLANS. PART III. ARDC IS DIRECTED TO
EXAMINE THE POSSIBILITIES OF ADDITIONAL MIDAS LAUNCHES IN THE
PERIOD APRIL-DECEMBER 1960 FROM ANY LOCATION.
BT
15/2102Z FEB RJEZHQ

?

NNNN

DOWNGRADED AT 12 YEAR
INTERVALS: NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

W D C E

1960 FEB 15 PM 2 50

RECEIVED

"A-PARAPHRASE NOT REQUIRED EXCEPT PRIO
TO CATEGORY B ENCRYPTION – PHYSICALLY RE
MOVE ALL INTERNAL REFERENCES BY DATE-TIM
GROUP PRIOR TO DECLASSIFICATION."

~~SECRET~~

SECRET

PRIORITY X AF HQ SAC MSGS C-0706 & VC 0206

ASST CINCSAC (SAC MIKE) LOS ANGELES CALIF

CINCSAC OFFUTT AFB NEB

/S-E-C-R-E-T/ FROM DSS-2-1-E

FOR DPL, DO AND DI. SUBJECT: (U) SAMOS/MIDAS PRESENTATION. REFERENCE HQ SAC MESSAGES C-0706 DATED 19 JAN 60 AND VC 0206 DATED 4 (9) JAN 60. FOLLOWING THE 10 FEBRUARY AFBSC MEETING THAT REVIEWED THE SAMOS/MIDAS DEVELOPMENT PLAN AND BUDGET, IT WAS THE OPINION OF AFBMD THAT MAJOR DIFFICULTY IN THE SOC/RFP AREA MAY BE ENCOUNTERED DURING THE PRESENTATION TO DR. YORK AT 1400 HOURS ON 19 FEBRUARY. IN VIEW OF THE COMMUNICATIONS BETWEEN GENERAL POWER AND GENERAL WHITE AS WELL AS BETWEEN GENERAL GRISWOLD AND GENERAL LEMAY ON THE URGENT REQUIREMENT OF SAC FOR THE SAMOS/MIDAS SYSTEMS, IT IS RECOMMENDED THAT SAC REQUEST SENIOR GENERAL OFFICER REPRESENTATION AT THE PRESENTATION ON 19 FEBRUARY. IT IS SUGGESTED THAT THIS REPRESENTATION BE FAMILIAR WITH THE REASONS AND DETAILS OF SAC REQUIREMENTS FOR DEVELOPING CONTROL AND PROCESSING EQUIPMENT AND PERSONNEL TRAINING SO AS TO OBTAIN THE BENEFITS FROM THE SYSTEMS

16 Feb 60

DSS (SAC MIKE)

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

OFFICE SYMBOL	ORIGINATOR W. H. Ray				
NAME (SIGNATURE)	1	2		WILBUR H. RAY Colonel, USAF Director of Space Systems (SAC MIK	
DATE					

Form 11
1 Nov 59

COORDINATION SHEET

SECRET

Replaces AFBMD Form 11, 1 Jun 59

[redacted]

6 of 5

[illegible]

~~SECRET~~

[redacted]

w majorland
1 Feb 1960

~~CONFIDENTIAL~~ SECRET

1 7L
Dir/Jnt
Samos
midas
discvr

197

TAB	DATE	ITEM
1	13 Aug 59	USAF Msg, AFXPD-PL 63806, Cites OSD Msg DEF 963459 (Cy atchd) changing name of SENTRY to SAMOS and directs compliance.
2	15 Aug 59	OSD ARPA Msg, DEF 963871, establishes 10 flight MIDAS R&D program with FY 60 ceiling of $46.9 million. Subsequently amplified by Amend No. 7, ARPA Order 38-60, 26 Aug 59.
3	5 Sep 59	OSD ARPA Msg, DEF 964914, in three parts: 1. Authorizes SAMOS readout program per 15 Jul 59 Dev Plan at FY 60 funding of 143.7 M. 2. Authorizes award on SAMOS E-5 (recovery) camera only and directs cost submission. 3. Directs estimates on MIDAS program for 46.9 M of FY 60 funds.
4	9 Sep 59	ARPA Ltr, Johnson to Glennan, Schedules launch of first and second ATLAS from AMR and transfers launch of third and fourth ATLAS from PMR.
5	10 Sep 59	OSD ARPA Msg, DEF 965117, modifies 964914 (4 Sep). Includes SAMOS recovery within ARPA total of 148 M for FY 60, for planning purposes ARPA FY 61 level of 170 M for SAMOS.
6	15 Sep 59	Two ltrs from Gen Schriever to Gen White expressing his concern about the SAMOS and MIDAS programs.
7	22 Sep 59	SAC msg, DPL 2674, recommends that AFBMD and SAC conduct survey to determine if the Central Tracking & Acquisition Station for SAMOS can be sited adjacent to an Active AFB.
8	2 Oct 59	AFDAT Msg, 78900, Development Plan should accommodate both readout and recovery parts of SAMOS within $148 M ceiling as far as possible.
9	16 Oct 59	1st Msl Div Msg, DS 630, recommends that direct AFBMD/PMR contact be established for technical matters re missile flight safety on DISCOVERER launches. 1st Msl Will continue to act as single point of contact for support of AFBMD programs on Pt Arguello.
10	20 Oct 59	ARDC msg, RDRRB-20-10-[illegible]-E, quotes Memo from Sec of AF to Chief of Staff, 13 Oct 59, directing that all SAMOS/MIDAS and DISCOVERER actions be handled in AFBMC framework.
11	23 Oct 59	ARDC msg, RDRRB-23-10-31-E, quotes ltr from Gen LeMay to Gen Schriever, 13 Oct 59, giving current status of SAMOS/MIDAS Problems. Cites funding in financial plan. Is in answer to the two letters from Gen Schriever to Gen White, 15 Sep 59.

DOWNGRADED AT 12 YEAR INTERVALS; NOT AUTOMATICALLY DECLASSIFIED. DOD DIR 5200.10

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DCAH-82

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TAB	DATE	ITEM
12	27 Oct 59	AFBMD msg, WDZSS-[illegible]-3-E in six parts: 1. Msg submitted in anticipation of a revised SAMOS Development Plan & Operations Annex. 2. Establishes Ground Rules for this estimate. 3. Establishes SAMOS flight schedule. 4. Gives flight configurations of each flight. 5. Investigation of E-3 Recon Payload. 6. Additions to facility requirements.
13	29 Oct 59	ARDC msg, RDRRB-29-10-38-E, quotes AFDAT msg 1259/59, 19 Oct 59, designates AFBMD the Executive Management Agency to insure fully coordinated Development, operational and logistic plans are forwarded to AFDAT by 23 Nov 59.
14	31 Oct 59	AFBMD msg, WDZSS 10-6-E, information for Gen Schriever's forthcoming meeting on SAMOS in four parts: 1. Chronology of major reviews and events that have effected the SAMOS Development Program. 2. Chronology of major reviews and guidance. 3. Sketch of Subsystems. 4. Summary.
15	9 Nov 59	AFDAT msg, [illegible], requirement for COMINT Capability and Encryption receiving appropriate action by AFDAT. Notify SAC and AFSS when COMINT and Encryption are included in SAMOS development.
16	11 Nov 59	AFDAT msg, 59355, states that no definite dates have any validity for events such as turnover of responsibility for SAMOS from AFBMD to SAC. Rather turnover dates will be determined by prior demonstration of an agreed capability.
17	13 Nov 59	ARDC msg, RDRRB-13/11/198, quotes AFDAT msg [illegible]/59, in three parts: 1. Changes date to 16 Dec 59 for presentation of detailed plans for MIDAS and SAMOS 2. Current status of FY 60 & 61 funds for SAMOS, MIDAS and DISCOVERER. 3. Assumed that presently programmed funds for SAMOS, MIDAS and DISCOVERER are adequate for period thru 31 Dec 59. Request for notification of fund requirements thru [illegible] Jan 60.
18	17 Nov 59 ✓	Three memos from Sec of Def to Sec of AF on transfer of MIDAS, SAMOS & DISCOVERER programs to the DAF
19	7 Dec 59	Memo from Secretary of Defense to ASD (Comptroller) directing the transfer of funds from ARPA to the DAF for the MIDAS, SAMOS and DISCOVERER programs.

SAMOS	[redacted]
DISCOVERER (Including AGENA)	[redacted]
MIDAS	[redacted]
TOTAL	[redacted]

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TAB	DATE	
20	14 Dec 59	Draft of Minutes of the 42nd Meeting of the Air Force Ballistic Missiles Committee. Purpose: To review the DISCOVERER SAMOS and MIDAS programs
21	15 Dec 59	Ltr from DAF to ARDC, subj: Transfer of FY 19[illegible]0 Space Programs from ARPA to AF.
22	17 Dec [illegible]	ARDC Msg, RDRRB 17/12 32E, quotes SAC msg, [illegible]V 5541, Gen Griswold to Gen Schriever, reference fund reduction, SAMOS MIDAS program.
23	22 Dec 59	ARDC msg, RD[illegible]B 22 12/35E, quotes msg from Gen Schriever to Gen White regarding transfer of and retaining ownership and/or control of Real Estate and Technical, Range and Support facilities associated with space programs destined for operational use by the AF. Part II quotes USAF answer.
24	22 Dec 59	AFDAP msg, [illegible]212, provides guidance for AFBMC meetings 14-1[illegible] Dec 59 on DISCOVERER, SAMOS and MIDAS
25	23 Dec 59	USAF msg, AFPDP-2A [illegible]A, subj: Cadre Manning and Training for SAMOS MIDAS. (Phasing of Blue Suiters to [illegible])
2[illegible]	2[illegible] Dec 59	Trip Report by Maj Wear to ARPA ARINC, 1[illegible]-1[illegible] Dec 59, re. Reliability Aspects of MIDAS and SAMOS, w/3 attachments: 1 Msg from ARPA on visit of ARPA and ARINC personnel to visit LMSD 2. Ltr from ARPA, subj: ARINC Consultation on Reliability Problems in the SAMOS Program 3 Msg from ARDC about changing the ARINC Report.
27	30 Dec 59	ARDC msg, RDY-30-12-[illegible], quoting ARINC's recommendation for Subsystem [illegible], SAMOS.
28	30 Dec [illegible]9	SAC msg, DPL [illegible]919, Subj: SAMOS and MIDAS. SAC's recommendtions for reduction or deletion of tasks within the SAMOS and MIDAS programs. Basic SAC position is that further slipping of SAMOS and MIDAS is inconceivable. Requests that ARDC establish a meeting by not later than 13 Jan [illegible]0 to develop a joint SAC ARDC recommendation to the Air Staff and AFBMC.
29	[illegible] Jan 60	ADC msg, ADLPD-DI, to Hq USAF, re. reduced funding of SAMOS MIDAS programs. They ask USAF three questions: 1. Has there been a directed change in MIDAS SAMOS Program urgency? If so, what were the considerations and basis for the decision? 2. What action is being taken to provide adequate funding for concurrent pursual of developmental and operational programs? 3. What change of action is expected of ADC in view of the reduced funding directives sent to ARDC by HQ USAF?

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TAB	DATE	ITEM
30	7 Jan 60	AFDAT msg. 61415, directs ARDC to include in their revised development plans the FY 62 & 63 fund estimates. These estimates to be based on maintaining the FY [illegible] ceilings in AFDAT msg [illegible]212 and the requirement to become operational as soon as practicable. Tentative revised schedule for revised plans is: 1 Feb to Air Staff, 5 Feb to Weapons Boards, 10 Feb to AFBMC, AFDAT to SD 15 Feb.

REC'D
AFBMD
ACTION WDL

27 FEB 1960 18 17

INFO: WDT
WDZ
WDG
WDC

pb
1c ~~199~~ 198

to pn to

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(Out-of-Channel TWX)

[illegible]
[illegible] RJWZBK
[illegible] RJEZHQ 347
P 271712Z
FM HQ USAF
TO RJWZBK/AF BMD LOS ANGELES CALIF
RJEZFF/ARDC ANDREWS AFB MD
BT
/~~S E C R E~~ T/FROM AFABF AND AFDDP 73993 "CAT AC"
THIS MSG IN THREE PARTS. PART I. THE DOD HAS APPROVED THE ESSENTIAL R&D PROGRAM FOR FY 60 AS INCLUDED IN DEVELOPMENT PLANS AS PRESENTED BY AF-BMD. THERE FOLLOWS PROGRAM FUND AMOUNTS FOR FY 60 BY WEAPON SYSTEM:

DISCOVERER	[redacted]
SAMOS	[redacted]
MIDAS	[redacted]

PROCUREMENT AUTHORIZATION IS BEING ISSUED TO HQ ARDC THIS DATE. BUDGET AUTHORIZATION AND NECESSARY ALLOCATIONS WILL BE ISSUED BY VS

262

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

PAGE TWO RJEZHQ 347
DIRECTOR OF BUDGET. NO APPROVAL HAS BEEN GIVEN FOR THE OPERATIONAL/ DEVELOPMENT PROGRAM AND UTILIZATION OF FY 60 FUNDS FOR THESE PURPOSES ARE NOT AUTHORIZED.
PART 2. IT IS DESIRED THAT ACTION BE TAKEN TO PROCURE 12 ADDITIONAL THOR/DISCOVERER VEHICLES AND 12 THOR/SPACE VEHICLES. THESE VEHICLES WILL BE SCHEDULED AT TWO PER MONTH NOV 1960 THRU MAY 1961. IN ADDITION, PROVISION WILL BE MADE TO RE-WORK PRESENT 12 THOR MISSILES IN PRODUCTION FOR 5TH SQD. REQUIREMENTS TO A THOR/SPACE CONFIGURATION AT A TWO PER MONTH RATE BEGINNING IN [illegible] 1961 AND CONTINUING THRU AUG 1961. FUNDS IN THE AMOUNT OF [redacted] ARE BEING ISSUED IN THE DISCOVERER PROGRAM FOR THIS [illegible]. [illegible] EVENT A DIFFERENT SCHEDULE IS REQUIRED FOR MOST [illegible] AND ECONOMICAL PRODUCTION OF BOOSTER REQUEST THIS [illegible] ADVISED AS TO REVISED SCHEDULE. IN ADDITION, [redacted] [illegible] TO PROCURE THE LEAD TIME ON FOUR ADDITIONAL [illegible] [illegible] THESE FUNDS AND BOOSTER REQUIREMENTS [illegible] WILL BE SEPARATELY IDENTIFIED WITHIN THE DISCOVERER [illegible].
[illegible] OF FY 60 FUNDS AS [illegible] APPROVAL OF THE [illegible]

#1

PAGE THREE RJEZHQ 347
ACTIONS TAKEN WITH FY 60 FINANCING WILL BE COMMENSURATE WITH A
CAPABILITY TO REVISE CERTAIN PORTIONS OF THE SAMOS PROGRAM PRIOR
TO 1 JUL 60 ASSUMING PRIORITY FOR VARIOUS ELEMENTS OF PROGRAM AS
STATED IN PRESENTATION BY AFBMD.
BT
27/1718Z FEB RJEZHQ

NNNN

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M D C E

"AC–PARAPHRASING NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION. PARAPHRASE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION–NO UNCLASSIFIED REFERENCE IF DATE-TIME GROUP IS QUOTED."

RECEIVED

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

SECRET

[illegible]

[illegible] for a joint French - U.S. military satellite [illegible] has been prepared for possible use as a counter to recent Soviet offers of a joint French - Soviet scientific satellite project. The proposal describes the essential elements of the project and is believed suitable for use as the instrument of agreement for conduct of the project. The proposal implies that the French will bear the costs of building and tracking the satellite. Four sample budgets have been included indicating possible alternative allocations of booster and technical assistance costs.

A joint military satellite project may favorably influence the problem of siting intermediate range ballistic missiles. Simultaneous prosecution of French - Soviet and French - U.S. projects may also yield technical intelligence data on the Russian space boosters. Implementation of projects of this nature will permit the continued growth of AFBMD experience in this type of space activity subsequent to the completion of presently programmed activity in support of NASA.

A substantial reduction in the planned level of NASA support during the coming year, together with the completion of Thor [illegible] testing, recently announced publicly, assures an adequate [illegible] capability to support several projects of the type described. Thor missiles currently in production are potentially available for space missions and could be made available for these projects. A recent load loading at AMR indicates [illegible] utilization of Stands 17A and 17B subsequent to October 1960.

[illegible]

EXCLUDED FROM AUTOMATIC REGRADING; DOD DIR 5200.10 DOES NOT APPLY

SECRET

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[illegible] ARDC. In view of the probable need for prior consideration of the project by the French Ministry of National Defense, this proposal has been prepared specifically for a joint French-U.S. project. However, it is believed that consideration should be given to the simultaneous proffer of similar proposals to Great Britain and Western Germany or [illegible].

3. The AFBMD is prepared to furnish additional information and to brief interested personnel on request.

FOR THE COMMANDER

SIGNED

STROTHER B. HARDWICK
Colonel, USAF
Chief of Staff

1 Atch: Proposal for Joint U.S. - French Military Satellite Project

SECRET

WDZJP 3

200

CURRENT STATUS REPORT

Section 8
Research and Development
Mission Area

Date February 1960

SAMOS/117-L
system

BRIEF OPERATIONAL REQUIREMENT

SOR #80, dated 16 March 1955, and revised on 26 September 1958, established the requirement for a strategic reconnaissance satellite system. The GOR #80-1 specified the requirement for a visual reconnaissance sub-system which would provide resolution of photographic images of low contrast objects from 20 ft. down to 1 ft. on a side on the ground as an ultimate. GOR #80-2 specifies the requirement for an electronic sub-system which should provide electronic reconnaissance intercept equipment in the band of frequency between 30 mcs and 40 kmcs. This sub-system should have a direction finding capability to locate emitters to within 5 miles. GOR #80-4 specifies the requirement for a mapping and charting sub-system which would be able to identify and locate points or objects on the photography to within plus or minus 1,000 ft. of their true location in relation to the world geodetic grid.

PROGRAM/STATUS

Twenty-five satellites are scheduled to be launched for the purpose of R&D from September 1960 through December 1962. The first 3 will have components of both the early photo and ferret subsystems. At the conclusion of this series, 8 launches of satellites with the E-2 or 36" focal length camera are planned commencing in April 1961 and 7 launches of the F-2 and F-3 ferret subsystems commencing in June 1961 are planned. The first of 7 launches of the E-5, high resolution reconnaissance camera is scheduled for launch in August 1961. The payload for this E-5 series will be recovered after re-entry into the earth's atmosphere. All of these launches will be conducted from the Pacific Missile Range and will be fired into circular polar orbits to an altitude of 261 nautical miles.

Two tracking and acquisition stations are planned for this system during the R&D phase. One of these will be located at Vandenberg Air Force Base, and the other at New Boston, New Hampshire. Another two stations are required for the operation of the program; one will be constructed at Ottumwa, Iowa, and the other at Ft. Stevens, Oregon. These stations will perform the function of tracking the satellite and the reading out of the data when the satellite is interrogated. The data collected will be released from the T&A stations to a Space Operations Center to be located at SAC Hq, Omaha, Nebraska. At the Space Operations Center military personnel will perform the function of preparing programmed commands which will be transmitted to the satellite via the T&A stations. Additionally, a military organization will process the reconnaissance information obtained from the satellites into usable intelligence data for appropriate dissemination.

The program presented was approved by the Air Force Ballistic Missile Committee in a meeting on 10 February 1960. The objectives of the program are that the system be capable of flying some satellites for intelligence exploitation during a development/operational phase starting in August 1962. Turn-over of the system

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CURRENT STATUS REPORT

Section 8
Research and Development
Mission Area

Date February 1960

SAMOS-117-M
continued

PROGRAM/STATUS (Cont'd)

to SAC is now scheduled for July 1963. To accomplish this the following funds are required:

	FY 1960	FY 1961	FY 1962	FY 1963
R&D	$160.0	$199.9	$112.0	$67.0
DEV/OPS	7.7	26.1	109.8	100.1
Total	$167.7	226.0	$221.8	$167.1
Facilities				
R&D	2.5			
DEV/OPS	.9	6.1	7.0	
Total	3.4	6.1	7.0	

PROBLEMS

An approved development plan is required. The above program was presented to various panels of the Weapons Board on 1 February 1960 and to the Weapons Board on 3 February 1960 and to the Ballistic Missile Committee on 10 February 1960. Approval for this program was provided with the additional funds required of both the ceiling amounts available to come from either internal Air Force reprogramming or DOD emergency sources.

AIR STAFF ACTION

None required at this time.

AFDAT

DMS / Samos Mar-Apr

SECRET

Submitted for Gen B's Speech 3-60

201

STATUS REPORT - SAMOS

The SAMOS program is confused at this time due to the fact that specific authority has not been provided by the Department of Defense to conduct the program in accordance with the desires of the Air Force. If approval does come, the Air Force desires to conduct a total of 25 test launches from September of 1960 through December of 1962. The first 3 tests will be for the purpose of testing components of both the ferret and photo systems. Following that will be 8 tests of the 36" focal length camera system, 7 tests of the 66" recovery satellites, 4 tests of the digital ferret system and 3 tests of the analogue ferret system. To conduct this program AFBMD estimates that $160 million will be required in FY 1960 and $200 million in FY 1961. To insure that there will be an operational capability at the completion of the R&D program it is also desired to purchase long lead time items for the operational program starting with $7.7 million in FY 1960 and $26.1 in FY 1961. The latter is the program which has yet to be approved by the Department of Defense. The total availability of the FY 1961 estimated fund requirement is also in doubt. We therefore cannot perceive to plan for a sensible program for SAMOS until we have received guidance from the Department of Defense.

670

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

SECRET

Don't know if signed!
OMS/S/Mar-Apr 60

SECRET

~~probably Dec 10, 1959~~
probably ~~Apr 60~~
date [illegible]
USAF Space Programs 1945-1962

20

MEMORANDUM FOR THE SECRETARY OF THE AIR FORCE

SUBJECT: Intelligence System SAMOS

REFERENCES: Memo from SecDef to SecAF, dtd 17 Nov. 59; subject "Transfer of the SAMOS Development Program to the Department of the Air Force."

On 10 April 1958 certain parts of the SAMOS program were assigned a national priority in order to establish an early operational capability. An attempt to gain this early capability will, undoubtedly, interfere with the research and development program and can only have the effect of delaying the overall program. At the present time many questions are unanswered about the capabilities of SAMOS that could have been answered by now if the development project had been carried out as originally conceived. Apparently, both the contractor and the technical support committees have been confused and slowed down by the impact of operational requirements before the actual capabilities of the system have been established on a developmental basis. This condition has led to advance planning, including facilities and hardware procurement ~~based on evalua~~tion of hypothentical outputs and needs for the SAMOS system.

It is necessary that the elements of the system be thoroughly tested in order to evaluate this particular method of reconnaissance. In order to concentrate funds where most sorely needed, i.e., in the development area and to speed up the program, it is recommended that steps be taken at the earliest possible date to stop the expenditure of funds for operational aspects of SAMOS. This would include the training of personnel; acquisition of land and new facilities, including the SAMOS aspect of the rehabilitation of the Martin Bomber Plant, Offutt AFB; all data links including the R&D data link from Vandenberg to Sunnyvale; operational launching facilities; operational data and materiel; as well as any equipment needed to process the R&D outputs in an attempt to provide operational warning.

In preparation of the revised development plan under the referenced memorandum, it has been requested that the program be reoriented. It is further recommended that funds presently available for SAMOS be appropriately programmed to emphasize research and development in such a manner as to obtain proven feasibility and reliability of the system at an earlier date than now envisaged.

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

SECRET Written [illegible] by Bouchey

The revised development plan should provide for continued R&D in the following areas, listed in order of priority:

a. Recoverable photo package (E-5). ITEK study 50" to 70" 54" } 5 ft.

b. E-1 and ~~[illegible]~~ E-2 R&D read-out packages. 6" - E-2 - 36" } both readout

c. E-3 study completed. study, RCA tape rather than film processing

d. Read-out photo package completed } Subsys E ground eqpt

e. One set of research and development ground photo read-out equipment, consisting of the minimum required to evaluate E-1 and E-2 package, completed.

f. Only one tracking and acquisition station equipped with a minimum number of "E", F ~~"[illegible]"~~ and "H" components, without data links as planned, established at Vandenberg AFB.

g. F-1, F-2 and F-3 packages continue on the present R&D basis. Read-out for these to be processed by a limited Subsystem "I" program with no emphasis on quick processing to obtain warning at this time. agree!

h. Subsystem "T" completely reoriented and limited to the use of existing resources to exploit the intelligence wherever possible. Equipment developed for processing, storage, recall and viewing must improve or replace. equipments now in use that perform the same functions but do not have the capacity to handle the SAMOS collection capability. Individual equipments will be integrated as a system using existing facilities and at a place that will allow for expeditious R&D evaluations as well as maximum exploitation of the end results.

The staff of the Office of the Assistant Director for Special Projects, DR&E, will be available for advise and assistance in regard to the above reorientation.

Herbert F. York

SECRET

203

CURRENT STATUS REPORT

Section 8
Research and Development
Mission Area

Date April 1960

SAMOS/117-M
system

BRIEF OPERATIONAL REQUIREMENT

SOR #80, dated 16 March 1955, and revised on 26 September 1958, established the requirement for a strategic reconnaissance satellite system. The GOR #80-1 specified the requirement for a visual reconnaissance sub-system which would provide resolution of photographic images of low contrast objects from 20 ft. down to 1 ft. on a side on the ground as an ultimate. GOR #80-2 specifies the requirement for an electronic sub-system which should provide electronic reconnaissance intercept equipment in the band of frequency between 30 mcs and 40 kmcs. This sub-system should have a direction finding capability to locate emitters to within 5 miles. GOR #80-4 specifies the requirement for a mapping and charting sub-system which would be able to identify and locate points or objects on the photography to within plus or minus 1,000 ft. of their true location in relation to the world geodetic grid.

613

PROGRAM/STATUS

Twenty-five satellites are scheduled to be launched for the purpose of R&D from September 1960 through December 1962. The first 3 will have components of both the early photo and ferret subsystems. At the conclusion of this series, 8 launches of satellites with the E-2 or 36" focal length camera are planned commencing in April 1961 and 7 launches of the F-2 and F-3 ferret subsystems commencing in June 1961 are planned. The first of 7 launches of the E-5, high resolution reconnaissance camera is scheduled for launch in August 1961. The payload for this E-5 series will be recovered after re-entry into the earth's atmosphere. All of these launches will be conducted from the Pacific Missile Range and will be fired into circular polar orbits to an altitude of 261 nautical miles.

Two tracking and acquisition stations are planned for this system during the R&D phase. One of these will be located at Vandenberg Air Force Base, and the other at New Boston, New Hampshire. Another two stations are required for the operation of the program; one will be constructed at Ottumwa, Iowa, and the other at Ft. Stevens, Oregon. These stations will perform the function of tracking the satellite and the reading out of the data when the satellite is interrogated. The data collected will be released from the T&A stations to a Space Operations Center to be located at SAC Hq, Omaha, Nebraska. At the Space Operations Center military personnel will perform the function of preparing programmed commands which will be transmitted to the satellite via the T&A stations. Additionally, a military organization will process the reconnaissance information obtained from the satellites into usable intelligence data for appropriate dissemination.

The program presented was approved by the Air Force Ballistic Missile Committee in a meeting on 10 February 1960. The objectives of the program are that the system be capable of flying some satellites for intelligence exploitation during a development/operational phase starting in August 1962. Turn-over of the system

5

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CURRENT STATUS REPORT

Section 8
Research and Development
Mission Area

Date April 1960

SAMOS-117-M
continued

PROGRAM/STATUS (Cont'd)

to SAC is now scheduled for July 1963. To accomplish this the following funds are required:

	FY 1960	FY 1961	FY 1962	FY 1963
R&D	$160.0	189.9 $199.9	$112.0	$67.0
DEV/OPS	7.7	26.1	109.8	100.1
Total	$167.7	226.0 216.0	$221.8	$167.1
Facilities				
R&D	2.5			
DEV/OPS	.9	6.1	7.0	
Total	3.4	6.1	7.0	

6 14

PROBLEMS

An approved development plan is required. The above program was presented to various panels of the Weapons Board on 1 February 1960 and to the Weapons Board on 3 February 1960 and to the Ballistic Missile Committee on 10 February 1960. Approval for this program was provided with the additional funds required of both the ceiling amounts available to come from either internal Air Force reprogramming or DOD emergency sources. On 19 February 1960, the above program was presented to the DDR&E and representatives of the three Services. No approval has as yet been received.

| Change

AIR STAFF ACTION

None required at this time.

AFDAT

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AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Andrews Air Force Base
Washington 25, D. C.

12 April 1960

RDL

User Participation

AFBMD (WDG)
AF Unit Post Office
Los Angeles 45, Calif

1. This Headquarters is sponsoring strong participation by the using commands during the development and acquisition of weapons systems. The using commands are being urged to establish authoritative representation at the ARDC Division/AMC Center locations to make, or obtain promptly, the decisions which are the responsibility of the using commands.

2. Representatives of the Development Divisions met at this Headquarters on 18 February to formulate a policy which would guide the establishment of working relations with the using command elements at the Division Headquarters. This draft policy was discussed with representatives of Headquarters AMC and Headquarters ADC on 11 March. It was nearly suitable for use by Headquarters AMC and, therefore, has been modified slightly so that the Commanders of ARDC Development Divisions and AMC Centers will be guided by identical policies. Attachment 1 is a copy of the policy.

3. This policy provides an adequate basis for establishing local procedures and retains both the ARDC and the AMC responsibilities for development and acquisition of weapons systems.

/s/ JAMES FERGUSON
JAMES FERGUSON
Major General, USAF
Vice Commander

1 Atch
Policy Statement

PARTICIPATION BY USING COMMANDS DURING THE DEVELOPMENT AND ACQUISITION OF WEAPONS SYSTEMS

1. The efficient management of aerospace system development, acquisition and delivery is dependent upon day-to-day decisions on the technical, logistical, and operational features of the system. The net effect of these decisions is a useful system. The inter-relationship of these decisions requires complete understanding of the technical, logistical, and operational aspects at the management location. Both ARDC and AMC have authoritative representation at the system management location. AMC and ARDC want strong user participation at the same location

2. The AMC/ARDC objectives in sponsoring strong user participation are to:

   a. Fill the gap between submission of a QOR by the using command and issuance of a Development Directive by Headquarters USAF with local participation in preparation of the Development plan (AFR 20-11).

   b. Increase the stability of USAF programs from the initial phase onward by basing programming actions on the combined technical competence, operational experience, and logistics knowledge of the agencies concerned.

   c. Achieve concurrency of action that reflects full integration of planning, programming, and budgeting of the operational, development, and logistics aspects of our program.

   d. Encourage using command organizations located at AMC Centers, ARDC Divisions to make day-to-day decisions for their command which will permit ARDC and AMC to carry out their development and logistic responsibilities as rapidly and efficiently as possible.

   e. Insure the validity of proper time phasing of advance plans for materiel, personnel, facilities, and equipment (AFR 5-47).

   f. Insure the users' cooperation in inter-system and intra-system integration and phasing.

   g. Simplify and expedite the conduct of necessary tests

   h. Expedite the attainment of operational capabilities.

/s/ JAMES FERGUSON
JAMES FERGUSON
Major General, USAF
Vice Commander

SECRET

205

20 April 1960

MEMORANDUM FOR THE SECRETARY OF THE AIR FORCE

SUBJECT: SAMOS, MIDAS and DISCOVERER Research and Development Programs and Development/Operational Plans for SAMOS and MIDAS Programs

Reference; Memorandum for Secretary of Defense from Under Secretary of the Air Force, subject: Transfer of the SAMOS MIDAS and DISCOVERER Development Programs to the Department of the Air Force, dated 18 Feb 1960

The referenced memorandum submitted for review and approval proposed Research and Development Programs for SAMOS, MIDAS and DISCOVERER and proposed Development/Operational Plans for the SAMOS and MIDAS programs. The Development/Operational Plans have been referred by the Secretary of Defense to the Joint Chiefs of Staff. The Development/Operational Plans will be reviewed and guidance provided by separate action.

The Research and Development Programs were submitted on the basis that there were available to these programs, as presented, totals of $262.4 million in FY 1960 and $256.0 million in FY 1961. These amounts are stated by the Air Force to be less than required to accomplish the Research and Development Programs as submitted. The additional amounts required for FY 1960 are stated to be $20.6 million for MIDAS, and understood to be $5.0 million for DISCOVERER. The programmed amounts requested for FY 1961 exceeded the amounts programmed in the FY 1961 budget estimates. However, it is recognized that the amounts for these programs are involved in the Air Force reprogramming proposal now pending before the Congress. In view of these circumstances, the amounts for funding used herein are for program guidance purposes only and actual funding will be determined through usual fiscal channels.

The MIDAS Research and Development Program, as submitted by the Air Force, has been reviewed and the recommended program, estimated at $51.9 million for FY 1960 and $106.8 million for FY 1961, is approved in principle. It is understood that steps are under way within the Air Force to implement the MIDAS program in accordance with the objectives of the recommended Research and Development Program, as presented, and that related reprogramming actions are being taken.

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The DISCOVERER Research and Development Prcgam has been reviewed. In accordance with subsequent discussions held with this office, it is understood that the Air Force concurs in extending the DISCOVERER program b six additional vehicles and will prepare a revized plan reflecting this extension/ Fund requirements as presented are stated to be $76.1 million for FY 1960 and [redacted] for FY 1961 amount is subject to adjustment contigent upon the submission and approval of a revised Plan b the Air Force/ and reprogramming action results.

The SAMOS Research and Development Program has been reviewed. As outlined in subsequent discussions held with this office, it is apparent that the SAMOS REsearch and Development Program as presented must be further adjusted. You are authorized to proceed on an interim basis within funding availability of $160.0 million for FY 1960 and a planning estimate of $189.9 million for FY 1961. It is desired that current effort assure that available resources are applied to fully achieve reconnaissance development objectives, including schedule, in order of priority; accepting slippages as necessary in the lower priority items. The priority established for the Research and Development Program provides for emphasizing photographic paylods over ferret, and within the photographic mode, recovery over readout. Adjustment required due to the revised planning estimate for FY 1961 should be accommodated to the extent possible within the ferret area. It is desired that Air Force recommendations for programs adjustments be provided for further review.

None of the foregoing should be construed as approval of any military constructions items, which are to be handled separately.

/Signed/ Herbert F. York

cc: ASD (Comptroller)

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Rd# E / 206

LOCKHEED AIRCRAFT CORPORATION

MISSILE SYSTEMS DIVISION · SUNNYVALE, CALIFORNIA

In reply refer to:
LMSD-360726

19 May 1960

Subject: Augmented Re-Entry and Recovery Program

To: AFBMD
Attn: WDZY Col. F. C. E. Oder
Air Force Unit Post Office
Los Angeles 45, California

Enclosure: (a) "Augmented Re-Entry and Recovery Program," SECRET, LMSD-360733

1. Recent events have underscored the necessity for recovering reconnaissance and other payloads from orbit at an accelerated pace and with the utmost of reliability and security. The timeliness of this capability is such that the Air Force and industry should re-examine the best ways to exploit present technology to achieve both an early and a long term capability for recovering valuable payloads from orbit. Of these, the early capability should receive special emphasis.

2. At LMSD we have continuously analyzed various techniques for re-entering the earth's atmosphere and recovering capsules at the earth's surface. These methods involve everything from ballistic re-entry with parachute recovery represented by the early Discoverer experiments to combinations of drag and gliding recovery. While we firmly believe that the programs now being sponsored by the Air Force at LMSD will lead to success, other methods with more flexibility and potential must also be exploited. We are enclosing a proposed program of effort which will reinforce the Air Force's capabilities, both in the near future and over a longer term.

3. Work at LMSD on the proposed program will be initiated in those areas authorized by Exhibits AFBM 60-6 and 60-31 of the Discoverer and Samos contracts. The broad activity, which is outlined in Enclosure (a), should be formalized by amendments and changes to existing contracts. Your concurrence in this plan of action is requested.

LOCKHEED AIRCRAFT CORPORATION
MISSILES AND SPACE DIVISION

D. J. Gribbon, Manager
Satellite Systems

[redacted]

DJG:pm

THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18 U.S.C. SECTIONS 793 AND 794. THE TRANSMISSION OR THE REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

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LMSD-360733
Enclosure (a) to
LMSD-360726
Page 1

E-1

PROPOSED AUGMENTED RE-ENTRY & RECOVERY PROGRAM

INTRODUCTION

The program for the accomplishment of de-orbiting and recovery of satellite payloads is of high national urgency. Successful bio-medical recovery and ultimately the recovery of reconnaissance payloads from orbit will have important national and international import.

The first successful recovery of payloads from orbit is planned through the program of capsule recovery tests now underway in the Discoverer Program. The engineering development of this system will permit reliable bio-medical recovery in a timely, useful fashion. The recovery system for heavier reconnaissance payloads is planned for development and test in the Samos E-5 Program.

680

OBJECTIVE

The importance of the system for de-orbiting and recovery of satellites payloads prompts the need for a program which will provide feasibility, development data and hardware for various more flexible and hence more operationally useable recovery techniques and systems. The primary objectives of the proposed program will be to:

a. Determine and develop various techniques and systems for backup to present recovery concepts.

b. Determine and develop an augmented program for de-orbiting and recovery systems which will provide greater operational and mission flexibility and growth potential.

PROPOSED WORK

LMSD will conduct a program of design study work leading to the development of various re-entry and recovery techniques and systems. Work will be initiated under AFBM Exhibits 60-6 and 60-31 of Discoverer and Samos contracts. The broad activity will be formalized by amendments and changes to these contracts. In directing the program toward the system characteristics as listed in the Technical Plan, LMSD will:

Establish requirements for various techniques and systems.

Prepare work statements providing the criteria for feasibility studies.

Award subcontracts for the conduct of selected studies.

Integrate and evaluate both LMSD and subcontractor studies to determine optimum course of system development.

Initiate complete system or component designs, where required.

Prepare detailed equipment lists, and appropriate schedules for their time of requirement.

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Establish ground and flight test objectives for development program.

Prepare a firm Program Development Plan, outlining approaches leading both to an early capability and to longer term system advancements.

Conduct hardware procurement program.

Conduct development and ground test program.

Design, develop and/or procure appropriate GSE.

Conduct flight test, data processing, and recycle programs as required.

Conduct follow-on developmental/operational programs as required.

189

The Work Statement will be prepared defining the requirements and criteria to be used for various suggested approaches. Subcontractors will be selected based on their past experience, know-how and/or actual manufacturing capability in performance analysis, capsule design, and re-entry and recovery system development. Paid small study contracts will be awarded to several sources for feasibility studies on an accelerated basis (4-6 weeks). The studies will require budgetary estimates for development to be furnished as well as technical solutions.

Concurrent with the subcontractor studies LMSD will conduct an in-house effort to permit rapid and thorough evaluation of proposed techniques, design, analytical methods, and programming considerations. This monitoring will be done by a specially created LMSD team which will also participate in subcontractor selection and evaluation of the final reports.

The following companies, in light of their past experience in fields related to this program, will be solicited for feasibility studies.

AVCO
Vidya-Itek
Cook Electric

In the event that certain of these sources decline, other qualified sources may be considered. Some of these are Goodyear Aircraft Co., CBS-Space Recovery, Inc., Chance-Vought, General Mills, Bendix Aviation, CALAC, Aeronutronics, McDonnell Aircraft, and STL, if the latter is contractually feasible.

As a result of these studies a development program proposal will be presented to BMD/BMC by 15 July 1960.

TECHNICAL PLAN

System Characteristics

Alternate re-entry and recovery techniques and the augmented system resulting from this program shall include the following general characteristics:

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a. The availability of the re-entry and recovery system components should be such that they can be mounted in Agena vehicles which can be used as alternates in the present Discoverer Program flight schedules.

b. The systems should have application to both the Discoverer and Samos E-5 Programs.

c. The systems should permit de-orbit from considerably higher altitudes than those encountered in any of the present re-entry programs to provide for space ferry and high altitude reconnaissance missions.

d. The re-entry body should be adaptable for controlled maneuvering re-entry to arrive at a designated spot.

e. The proposed systems should have growth potential for heavier payloads.

f. The re-entry body should be adaptable for both bio-medical and inert payloads.

Study Areas

A number of studies have been and are currently being conducted at LMSD concerning alternate re-entry and recovery techniques of space capsules. Results of these studies will be made available to the participants of the paid study phase.

Following is a partial list of systems pertaining to the re-entry and recovery sequence that will be investigated in this program.

-- High Altitude De-orbit

- Multiple restart main engine
- Restartable capsule retro-rocket

-- Orientation of the vehicle in preparation for de-orbit

- Agena attitude sensors and control system
- Capsule attitude sensors and control system

-- Capsule separation

- Pyrotechnic
- Mechanical springs
- Pneumatic impulse

-- Retro velocity source

- Agena engine restart
- Drag modulation below 140 miles
- Solid or liquid pusher or tractor system on capsule

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-- Retro velocity control
  - Torque bar spin up
  - Other stored energy
  - Spin retro motor only
  - Vector control of the retro motor
  - Combination of spin and retro firing
  - No spin requirement (Capsule stabilized)
  - Despin by changing roll moment of inertia
  - Inertial stabilization of the retro motor mount
  - Capsule spin up and/or spin down with solid propellent motors
  - Spin retro motor and differential spin of capsule

673

-- Reorientation for approach to the atmosphere
  - Attitude control system
  - Aerodynamic drag brake
  - Residual spin
  - No requirement

-- Re-entry
  - Lifting re-entry
  - Ablation heat protection
  - Zero lift with aerodynamic stability
  - Combined drag brake and maneuvering re-entry
  - Ballistic re-entry at low w/C_oA drag brake (Ref AVCO Research Report #64, 1959)

-- Recovery
  - Ballistic and glide
  - Inflatable structure
  - Chute deployment, air snatch with water backup
  - Ground impact (Chute, air bags, spike, skids, wheels)

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JOINT MESSAGEFORM

SECURITY CLASSIFICATION SECRET 207

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SPACE BELOW RESERVED FOR COMMUNICATION CENTER

1960 MAY 25 PM 11:12

W D G E

PRECEDENCE: ACTION [illegible]

INFO

TYPE MSG (Check): BOOK MULTI SINGLE

ACCOUNTING SYMBOL: AF

ORIG. OR REFERS TO: [illegible] 19-5-35-E 19 May 60; [illegible] 4729 23 May

CLASSIFICATION OF REFERENCE

FROM:

[illegible]

SPECIAL INSTRUCTION

TO:

ARDC ANDREWS AFB MD

SECRET FROM WDZY -4897

ARDC FOR [illegible]. Reference your message [illegible] 19-5-35-E dated 19 May 60 and our message WDZY 4729 dated 23 May 60 which this message supplements. The Commander, AFBMD has reviewed the effort underway to plan for augmentation and/or acceleration for the SAMOS Program. It is now felt that sufficient study will be completed to allow review by General Schriever on/or about 14 June 60. Request you advise as to time and exact date General Schriever desires a presentation be made.

WDZ
WDG
[illegible]
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WDZYB

WDZY-82

MAY 24 1960

MONTH [illegible] YEAR 60

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SYMBOL: WDZY

TYPED NAME AND TITLE (Signature, if required): Col F.C.E. Oder/[illegible]

PHONE: 1646

PAGE NO. 1

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SECURITY CLASSIFICATION: SECRET

SIGNATURE: SIGNED

TYPED (or stamped) NAME AND TITLE:

FREDERIC C. E. ODER
Colonel, USAF
Assistant Deputy Commander
Space Systems

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WDC

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208

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D.C.

REPLY TO ATTN OF: AFDSD-AT

SUBJECT: (U) Exploitation of Initial SAMOS Data

JUN 1 1960

TO: ARDC

INFO TO: CINCSAC ADC AMC AFBMD

1. By letter of 20 April 1960, the Director of Defense, Research and Engineering approved in principle the Research and Development Plans for DISCOVERER, SAMOS and MIDAS, dated 15 January 1960. Separate correspondence as to specific changes and funds pertaining to this approval is being prepared; however, questions of operational command, operational facilities and user relationships for the SAMOS reconnaissance satellite continue to be matters of considerable discussion.

2. The Under Secretary of the Air Force directed on 27 May 1960 that the R&D exploitation and operational plans for SAMOS be re-evaluated. The Under Secretary stated that there is considerable technical uncertainty as to the character and quality of the information that may be obtained by the different payloads of this system and that the operational interest and the character of the initial operational programs will be strongly conditioned by the results of the R&D program. He noted that a very elaborate plan had been originally conceived for the operational control, data handling, data utilization, data volume, and data display elements of the SAMOS and MIDAS operational systems, but that approval of such a plan with authorization for expenditure of funds has not been forthcoming. This delay has occurred because of concern that the assumptions on such items as technical capabilities, schedules, data quality, frequency of coverage, payload reliability and lifetime, computer requirements, optimum camera types, etc., are open to considerable question and can affect in a major way the type of operational system that will ultimately be required. If, as a result of the R&D experimental flight program, recovery rather than readout turns out to be the best primary means for satisfying the bulk of the operational requirements, then the ground complex required for handling such data will be enormously simpler than if complete reliance is placed on readout to meet these requirements.

3. It is directed that a revised SAMOS Development Plan be prepared and submitted as soon as possible within the ground rules specified below. Deviations for valid reasons will be considered and may be presented as alternate plans.

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a. In order to have parallel R&D tests of readout and recovery systems, re-examine all applicable camera equipment, both on the shelf and in development, and make recommendations for the introduction of an additional recoverable payload development program with associated schedules and cost.

b. Endeavor to achieve the earliest flight dates for the different payloads with priorities in this order: photographic recovery, photographic readout, ferret. Consideration is to be given to possible delaying elements and added insurance against such delays.

c. Make provision for the minimum essential capability to handle in a reasonable fashion any operational take from the R&D flights:

(1) Include facility details, schedules, costs, manpower, and subsystem descriptions.

(2) Initial readout is limited to two sites.

(3) No wide-band data links authorized except Vandenberg-Sunnyvale.

(4) No provision is to be made for alternate satellite control centers: control to be exercised originally from Sunnyvale center.

(5) Capability will be limited to that required to handle one operating readout satellite at a time.

(6) System should be planned to permit growth capacity if R&D program results are promising and decision is made later to use readout primarily.

(7) Processing capability should be adequate for recovered as well as readout data.

(8) Personnel staffing and training should be geared to the modified program. The present activities in this regard appear to be completely out of scale and out of phase time-wise.

(9) Provision will be made only for essential elements of subsystem I. Complexity and computer requirements introduced into this subsystem as a result of ferret payloads should be carefully reassessed. The very limited value of possible data from F-1 and F-2 militates against sophisticated data handling system. Subsystem I appears to have been greatly over-engineered, at least for the ferret aspects of the program.

(10) Computer programming problems, schedules and computer requirements for photographic readout payloads will be re-evaluated to determine whether it is reasonable to anticipate extensive pre-determined selective area coverage on request by intelligence in the R&D flights now scheduled. The interim facility requirements should be planned accordingly.

d. Determine the effects of the above on MIDAS and prepare necessary revisions to the MIDAS plans.

4. The proposed SAMOS interim operational capability should be located in the area where it is desired to establish the final operational facility and control center, if appropriate, or can consist of an augmentation to the R&D capability with Air Force personnel rather than contractor personnel responsible for the operation. The plan for this capability must include recommendations for its location with justification for the choice. The current plan is to use a very small portion of the old Martin bomber plant in Omaha with overlapping control systems for MIDAS and SAMOS. The Under Secretary questions the desirability of this plan and reports that CINCNORAD believes this is unacceptable and that MIDAS control, readout, display, etc., must be integrated in a common location with other defense subsystem elements such as those related to BMEWS. Therefore, questions of the following types must be considered in making a new plan for the interim operational capability:

a. Should the Air Force plan ultimately to establish the complete operational data handling, display and control elements of SAMOS and MIDAS at the old Martin Bomber Plant?

b. If not, or if there is serious question as to such desirability, is it sound to reactivate a minute area of this large plant for the interim operational equipment?

c. Should the entire complex be considered as basically a "peacetime" operation with survivability of all or part of the equipment of little importance?

d. Is it necessary or desirable to co-locate data handling and processing facilities with future control centers and should the SAMOS and MIDAS control centers be integrated?

5. Request this headquarters be notified of the earliest possible date that the requested plans can be formally submitted for appropriate briefings and presented to the Air Force Ballistic Missile Committee. ARDC is to act as team captain for the preparation of these plans with other commands participating as necessary. Further guidance will be provided by this headquarters on the questions in paragraph 4.

/signed/ Roscoe C. Wilson

ROSCOE C. WILSON
Lt General, USAF
Deputy Chief of Staff, Development

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~~[illegible]~~ PRIORITY

[illegible]

[illegible]

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[illegible] FOR R. J. [illegible]. Reference your letter to AFBMD, Augmented Re-Entry and Recovery Program dated 19 May 60 ([illegible]) and inclosure (a) thereto ([illegible] 360733). AFBMD concurs in your plan of action necessary to the submittal of a development program proposal to AFBMD/ARDC by 15 July 60 as indicated on page 2, inclosure (a) of reference with the following exceptions: (A) Under "Technical Plan - Systems Characteristics" subparagraph (e), we see no purpose served in planning these re-entry systems for de-orbiting from any higher altitude than required by the current [illegible] program. I do not therefore approve subparagraph (e) since it is assumed that the phrase "present re-entry program" includes the current [illegible] program. (B) The proposed subparagraph (f) is not [illegible] requirements for [illegible] other than [illegible]

[illegible]

JUN 1 1960

SIGNED

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DOD DIR 5200.10

OFFICE SYMBOL	[illegible]	[illegible]	[illegible]
NAME (SIGNATURE)	[illegible]	[illegible]	[redacted]
DATE	[redacted]	[redacted]	[redacted]

[redacted]

[illegible] [illegible] [illegible] study phase. At the time [illegible] submits its development plan please include copies of all internal and subcontractor studies performed incident to [illegible] [illegible]. This concurrence in your letter and inclosure should not be construed as recognition by the Air Force that any or all of the work contemplated therein necessarily constitutes work outside of existing contractual coverage. The scope of new work, if any, included in referenced program is subject to review and negotiation. Above authorizes [illegible] to prepare a development program proposal which is within the scope of contracts AF 558 and AF 563. The Air Force will determine the need for an expanded program upon review of your proposal and will take appropriate contractual action.

[illegible]

(7)

210

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HEADQUARTERS
AF RESEARCH & DEVELOPMENT COMMAND
UNITED STATES AIR FORCE
ANDREWS AIR FORCE BASE
WASHINGTON 25, D.C.

RDY 14 Jun 1960

(U) Exploitation of Initial SAMOS Data

Hq USAF ([illegible])
Wash 25, D. C.

INFO TO: CINCSAC ADC ARS AFBMD

690

1. Reference your letter dated 1 June 1960, subject as above. In compliance with the actions directed therein, a meeting was held at the Air Force Ballistic Missile Division, Los Angeles, California on 2-3 June 1960, at which there was representation from this headquarters, AFCIN, AFDAP, Hq SAC and AFBMD. In consequence thereof, the SAMOS Development Plan is being revised as soon as possible within the ground rules specified in the referenced letter.

2. In addition, action is being taken to re-examine Subsystem I to determine whether it is possible to simplify this Subsystem by separating the ferret aspects from the photo. Cognizance is being taken of the limited value of the data from early R&D flights of the P-1 and F-2 Subsystems. Further, the minimum essential equipment list for the processing of intelligence data which may accrue from the early R&D flights is being prepared.

3. It is requested that the separate correspondence pertaining to specific changes and funding mentioned in the first paragraph of the above referenced letter and the further guidance referred to in paragraph 5 thereof, be furnished this headquarters as soon as possible in order that the information may be integrated into the revised Development Plan.

4. The phraseology "SAMOS interim operational capability" in the first sentence of paragraph 5 of the basic communication is interpreted to mean "exploitation of the take during the R&D flights."

5. Furthermore, comments in that same paragraph pertaining to the location of this [redacted] dated 7 August 1959, subject: (U) Development of SAMOS.

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CO-7312

6. This headquarters expects to be prepared to brief the Air Force Ballistic Missile Committee on or about 15 July 1960.

/s/
JAMES FERGUSON
Maj General, USAF
Vice Commander

1 JUNE GUIDANCE (Gen Wilson ltr)

AF UNDER SECRETARY DIRECTS RE-EVALUATION OF R & D EXPLOITATION AND OPERATIONAL PLANS ---

"WHY"

A. CONSIDERABLE TECHNICAL UNCERTAINTY AS TO CHARACTER AND QUALITY OF INFORMATION THAT MAY BE OBTAINED BY THE DIFFERENT PAYLOADS.

B. CHARACTER OF THE INITIAL OPERATIONAL PROGRAMS WILL BE STRONGLY CONDITIONED BY R & D RESULTS.

REVISED SAMPS DEVELOPMENT PLAN REQUIRED ASAP.

GROUND RULES FOR DEV. PLAN REVISION

(GEN WILSON LTR.)

A. PARALLEL R & D RESTS OF READOUT AND RECOVERY

RE-EXAMINE ALL APPLICABLE CAMERA EQUIPMENT AND MAKE RECOMMENDATIONS FOR INTRODUCTION OF AN ADDITIONAL RECOVERABLE PAYLOAD EQUIPMENT.

B. ACHIEVE EARLIEST FLIGHT DATES FOR THE DIFFERENT PAYLOADS WITH PRIORITIES

PHOTO RECOVERY

PHOTO READOUT

FERRET

C. MAKE PROVISIONS FOR "MINIMUM ESSENTIAL CAPABILITY" TO HANDLE ANY R & D "TAKE".

D. CONSIDER EFFECT ON MIDAS PROGRAM

674

OTHER "KNOWN" GUIDANCE

A. DD/R&E STUDY - DR. BILLINGS

B. CONGRESSIONAL ACTION TO PROVIDE ADDITIONAL FUNDS TO SUPPLEMENT SAMOS PROGRAM

B. PRESIDENTIAL CONCERN

DR. BILLINGS PROPOSED PROGRAM CHANGES

DD / R&E STUDY

A. LIMIT E-2 TO A FOUR SHOT R&D PROGRAM

B. INTRODUCE AN ADDITIONAL RECOVERY PROGRAM WITH E-2 RESOLUTION AND A 180 MILE SWATH WIDTH

C. SIMPLIFY THE GROUND COMPLEX TO MATCH THIS PROGRAM

D. PROVIDE A JOINT INTELLIGENCE FACILITY FOR PRE-STRIKE SAMOS DATA PROCESSING

E. EXAMINE POST-STRIKE SAC REQUIREMENTS

DR BILLINGS' CONCLUSIONS OF DD/R&E STAFF STUDY

A. NATIONAL REQUIREMENTS ARE FOR GROSS PHOTO COVERAGE OF THE SOVIET UNION ONCE EVERY SIX MONTHS

B. A RECOVERY PROGRAM WITH E-2 RESOLUTION IS THE OPTIMUM WAY TO ACCOMPLISH THIS.

C. E-5 CAN HANDLE SPECIFIC TARGET COVERAGE

D. A READOUT PROGRAM OF ANY TYPE IS COSTLY, INFLEXIBLE & COMPLICATED

E. IN THE PRE STRIKE ERA THIS DATA SHOULD BE PROCESSED THROUGH THE ORGANIZATIONAL SYSTEM NOW IN EXISTANCE.

F. THE POST STRIKE SITUATION SHOULD BE STUDIED.

FEATURES OF THE REVISED PROGRAM

1. PROGRAM DIRECTED AT INSURING TECHNICAL SUCCESS
    * DEVOID OF CLASSICAL OPERATIONAL ASPECTS
2. RECOGNIZES A PROGRAM "IN BEING" WHICH CAN PROVIDE THE EARLIEST FLT.TESTING AND R&D TAKE
    * IMMEDIATE CHANGES TO EXISTING PROGRAM TO INCREASE CONFIDENCE IN SCHEDULES AND SUCCESS
    * R & D DATA HANDLING ONLY
3. RECOGNIZES REQUIREMENT FOR EARLIEST GROSS COVERAGE SYSTEM
    * INTRODUCES COMPREHENSIVE BACKUP RECOVERY SYSTEMS COMPLIMENTARY TO EXISTING CAPABILITITE.
4. FLEXIBILITY ACHIEVED
    * PADS, VEHICLES, PAYLOADS
5. INTRODUCES CONTRACTOR COMPETITION
6. AERO SPACE COPR. USED IN TECHNICAL ROLE
7. ADDITIONAL FUNDING REQUIRED

CHANGES TO PROGRAM "IN BEING"

ASSURE EARLY FLT SUCCESS

1. LESS SOPHISICATED TESTS ** BUT SIGNIFICANT

A. REMOVE F_1 FROM INITIAL FLTS UNTIL E_1 FEASIBILITY IS DETERMINED

B. MINIMUM COMMANDS TO VEHICLE AND PAYLOADS INITIALLY FOR E_2 (STEERING, IMC, ETC.)

C. INITIATE ONLY TWO ADD'L E_2 PROCUREMENTS (TOTAL OF 5)

ACCEPT 0.8 PROBABILITY OF DETERMINING FEASIBILITY (PROTECT LEADTIMES ON ADD'L THREE PAYLOADS)

D. INTRODUCE EARLIER RECOVERY TESTS OF E-5 CAPSULE MAY OR JUNE '61 DIAGNOSTIC FLTS (2)

E. MAKE E_5 A STEP FUNCTION DEVELOPMENT INITIALLY, ELIMINATE STEREO, STEERING, ORBIT ADJUST, ETC.

2. FLEXIBILITY THRU

A. ORDER ADD'L ATLAS & AGENAS NOW TO BE ON HAND FOR SPECIAL APPLICATION

B. INITIATE THOR (SOLID ROCKET ASSIST) DEVELOPMENT FOR USE WITH SMALLER PAYLOADS - RELIEVE PADS

C. ALIGNMENT OF TEST WING BUILD UP IN ACCORD WITH APPROVED PROGRAM

ALIGNMENT OF SUB SYSTEM "I"

COPY

SECRETARY OF DEFENSE

16 June 1960

MEMORANDUM FOR SECRETARIES OF THE ARMY, NAVY AND THE AIR FORCE

SUBJECT: Coordination of Satellite and Space Vehicle Operations (U)

Reference is made to the Secretary of Defense's memorandum of September 18, 1959, subject as above.

The decisions set down in the referenced memorandum are reaffirmed. Additionally, it is desired to emphasize the establishment of a joint military organization for control over operational space systems does not appear necessary or desirable at this time.

With specific reference to the first full paragraph on page 3 of the September 18, 1959, memorandum, the appropriate Military Department will include in its detailed plans for a particular system not only the user relationships with unified and specified commands and other appropriate agencies, but also, where applicable, provision for the exercise of appropriate operational authority by the unified and specified commanders responsible for the functional areas concerned.

S/Gates

DPLBC/~~LL~~ Col Mullin [illegible]4224/15 Jun 60/ft ④

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213

16 Jun 60

Lt General Bernard A. Schriever
Commander
Air Research & Development Command
Andrews AFB
Washington 25, D. C.

Dear Benny:

Attached for your information and retention is a copy of a letter that I have forwarded to General White as a result of General Wilson's letter of 1 June 1960, subject, "Exploitation of Initial SAMOS Data." (U)

I would appreciate having your comments on the attached letter and in particular your support in convincing General White that the USAF must develop a basic, operationally useable, SAMOS system at the earliest possible time. Sophistication and any required increased scope of activities should come later. (S)

This correspondence is classified SECRET because it reveals planning information concerning the SAMOS reconnaissance system. (U)

Sincerely,

1 Atch
Cy of Ltr to Gen White (S)

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HEADQUARTERS
STRATEGIC AIR COMMAND
Offutt Air Force Base
Nebraska

16 JUN 1960

702

General Thomas D. White
Chief of Staff
United States Air Force
Washington 25, D. C.

Dear Tommy:

General Wilson's recent letter to ARDC with SAC as an information addressee, directed ARDC to develop a revised Development Plan for Samos. Ground rules were laid down to develop a program reduced in scope and along less sophisticated lines. This same letter also went on to stress that questions concerning command and control, operational facilities, and user relationships still continue to be a matter of considerable discussion. (S)

During the past year and as recent as 21 May 1960, I have expressed to you on several occasions, my grave concern about the lack of progress in the Samos program and the urgent necessity for this system in the Strategic Air Command. In view of SAC's requirements for priority intelligence and the potentiality of Samos for improving the operational effectiveness of this command, it is inconceivable to me that we are still questioning the operational requirement for or the assignment of this system. (S)

I recognize that the questions on system reliabilities, readout versus recovery, degree of sophistication, program scope, etc., are all certainly understandable. By the same token, however, these same questions are not going to be resolved to everyone's satisfaction for years to come. There always will be new ideas and suggestions for product improvements. Recognizing this, it appears absolutely essential to me that we should vigorously concentrate our entire efforts on obtaining a basic, operational usable system at the earliest possible date, in order to obtain usable intelligence data for employment of the ICBM and manned aircraft force. Later on, after the initial system

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BAC DASMC Control No. 3223

has started to operate and has been turned over to SAC, the Samos system can be expanded as required in the form of product improvement. This procedure, of course, is the same one that has been and is currently being utilized in transitioning manned aircraft and ICBM systems from ARDC to SAC. (S)

Specifically I recommend that the basic system to be developed by ARDC for SAC be defined essentially the same as that described in paragraph 3 of General Wilson's letter. In this connection, it will be necessary for ARDC to plan for and install an operational control center in an existing facility on Offutt AFB. At this juncture, since the question of where to locate the data processing facility and the operational control center still seems to be under discussion, in some areas, I would like to review past actions on these facilities. (S)

The Strategic Air Command, on 5 August 1959, was delegated by the Vice Chief of Staff the responsibility for operational planning for employment and control of the Samos system. Further, in a letter from General Wilson to General Schriever, 7 August 1959, it was directed that the control and data processing capability for Samos would be established at Offutt AFB. Accordingly, SAC has conducted its preliminary operational planning in response to the above directives. As a result of numerous planning conferences, ARDC, AMC, ADC and SAC have unanimously agreed and each command has published mutually supporting detailed plans specifying that: (S)

a. The operational control and data processing elements of Samos should be installed in existing facilities on Offutt AFB. (S)

b. An interim data processing capability should be installed in existing facilities on Offutt AFB. This facility is required in conjunction with the very first R&D launch. (S)

c. Data handling must be co-located with the operational control for efficiency of operation and to permit close day to day coordination of efforts between these two integral parts of the systems. (S)

d. One integrated Samos and Midas control center located in existing facilities on Offutt AFB is essential in view of the highly inter-related use that the Samos and Midas make of common ground support equipment. Co-location of these two facilities will permit considerable monetary savings. (S)

Subsequent to the above actions, Hq USAF, on 25 Feb 1960, submitted to the Secretary of Defense operational plans for Samos and Midas. These USAF plans were in complete consonance with the jointly developed plans of ARDC, AMC, ADC and SAC. Subsequent to 25 Feb 1960 the Secretary of Defense forwarded the USAF plans for Samos and Midas to the JCS for comments and recommendations. (S)

In view of the above actions and recognizing that ARDC (AFBMD) has previously briefed the AFBMC as to why the operational control centers for Samos and Midas should be co-located at Offutt AFB, adjacent to the data processing facility, it is strongly recommended that no action be taken to change existing plans to locate these facilities at Offutt AFB. Any indecision on the part of the USAF, at this time, as to where to locate these facilities will undoubtedly be used to great advantages by external agencies. (S)

I am sure that you recognize the long range benefits that will accrue to the USAF from locating the operational control and data processing features of Samos at Offutt AFB. These operational facilities will without a doubt expand, over the years, into control of other instrumented satellites and manned space systems. Accordingly these facilities should be firmly integrated into the command and control structure of the USAF, by locating them at Offutt AFB. (S)

In conclusion I wish to emphasize that during the past year the Samos and Midas programs have been subjected to numerous reviews, repeated re-direction of efforts, continual re-examination of technical efforts, etc. To date, none of these exercises have resulted in a clear cut course of action. Consequently, it has not been possible to go ahead with long lead time items required for early operational facilities. This situation simply cannot be allowed to continue, in view of the U-2 incident and the dire need

AT 624

for strategic intelligence and tactical warning. I am sure that you will agree with me that it is absolutely essential that the Samos and Midas programs be gotten off of dead center. Maximum efforts must be taken to develop, as soon as possible, a basic, operationdly useable system. The sophistication and any required increased scope of activities should come later. (S)

10J

This correspondence is classified SECRET because it reveals planning information concerning the SAMOS reconnaissance system. (U)

Sincerely,

THOMAS S. POWER
General, USAF
Commander in Chief

ARDC Comdr 1 Apr 54 - 30 Jan 57

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Mgf/ cy 8-11 R&D 1

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION · SUNNYVALE, CALIFORNIA

In reply refer to:
LMSD/362526
61-12

215

20 June 1960

Subject: Augmented Re-entry and Recovery Program

To: AFBMD
Attn: WDZY, Col. F. C. E. Oder
Air Force Unit Post Office
Los Angeles 45, California

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107

Reference: (A) LMSD-360726 Letter, "Augmented Re-entry and Recovery Program" to AFBMD from D.J. Gribbon, Manager Satellite Systems, dated 19 May 1960 with enclosure (a), LMSD 360733, "Proposed Augmented Re-entry and Recovery Program."

(B) TWX for D.J. Gribbon, LMSD Sunnyvale, California, from WDZY 5271 AFBMD Los Angeles, California, P 011845Z

Enclosure: (a) Subcontract Work Statement, LMSD/362527

1. In compliance with your authorization in Reference (B), LMSD is proceeding with action necessary to the submittal of the Development Plan. LMSD is also currently letting study contracts to three selected subcontractors: AVCO, Cook Electric, and Vidya-Itek. Enclosure (a) represents our work statement as submitted to subcontractors.

2. While the above sources were selected primarily on the basis of their ready familiarity with the basic recovery problem, it has been recognized since the receipt of Reference (B) that the time span allocated for study is insufficient in view of the scope of the problem. In addition, the current activity on Revised Samos is presently requiring the major effort of personnel normally involved in re-entry and recovery system analysis. LMSD, therefore, intends to submit the Development Plan on 15 August 1960 in order to allow the incorporation of subcontractor study results and their evaluation as well as LMSD internal feasibility studies.

3. LMSD concurs with your decision to eliminate the requirement for de-orbit from significantly increased altitudes. There exists, however, requirements in the Discoverer program for recovery from orbit altitudes in excess of the current nominal 130 nautical miles. Also, there are indications that the target selectivity of the Samos E-5 system with roll steering can be enhanced by orbit control maneuvers resulting in orbit altitudes in the vicinity of 300 nautical miles at the time of de-orbit. It is, therefore, felt that advanced system considerations should not exclude the possible need for recovery from these slightly increased altitudes or eccentric orbits.

[redacted]

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Subject: Augmented Re-entry and Recovery Program

To: AFBMD/Attn: WDZY, Col. F. C. E. Oder

4. LMSD will comply with your directive not to consider biomedical re-entry requirements for this development plan beyond those currently planned for the Discoverer.

LOCKHEED AIRCRAFT CORPORATION
MISSILES AND SPACE DIVISION

D. J. Gribbon, Manager
Satellite Systems

DJG:AKE:rm

cc: AF Plant Representative
Sunnyvale, California

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~~Enclosure to LMSD/~~ [illegible]26

~~**SECRET**~~

LMSD/362527
Dept. 61-12
Date: 20 June 1960

Copy No. E-1

Page 1

This document consists of 7 pages classified ~~SECRET~~

STATEMENT OF WORK FOR
RE-ENTRY AND RECOVERY STUDIES

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TABLE OF CONTENTS

SECTION I. INTRODUCTION

SECTION II WORK/COST ELEMENTS (DIRECT)

Item 1. Specific Study Areas

Item 2. Technical and Management Reports

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SECTION I - INTRODUCTION

In order to insure reliable recovery of satellite payloads from orbit with the highest possible confidence level, it is desirable at this time to re-examine the total re-entry and recovery problem for possible selection of an alternate approach to the Air Force Discoverer and Samos recovery programs. In addition to providing alternate approaches to the currently tested recovery systems for these programs this study should examine means to provide added flexibility and potential beyond the nominal performance of these current systems. Studies performed are to be aimed at the synthesis of a single integrated system and shall define the initial design characteristics of such a system. These design characteristics shall be used for possible selection of a system for flight testing within the Discoverer and/or Samos Program.

The subcontractor shall perform a study of 4-6 weeks duration which will define the initial design characteristics of a complete re-entry and recovery system applicable to both Discoverer and Samos and satisfying objectives and requirements outlined under Section II, Item 1.

The subcontractor shall demonstrate by analysis or other means that proposed techniques are feasible and require no major component development inconsistent with proposed schedules for delivery of flight item.

The subcontractor will submit analysis showing the capability of his proposed system to meet the requirements of the present Discoverer and Samos missions. The possible extension of the system to satisfy the other objectives mentioned under Section II, Item 1, will be discussed.

THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U.S.C., SECTION 793 and 794. THE TRANSMISSION OR REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW